

**DAIKIN**

# Engineering Data

## Marine Type Water Cooled Packaged Air Conditioners

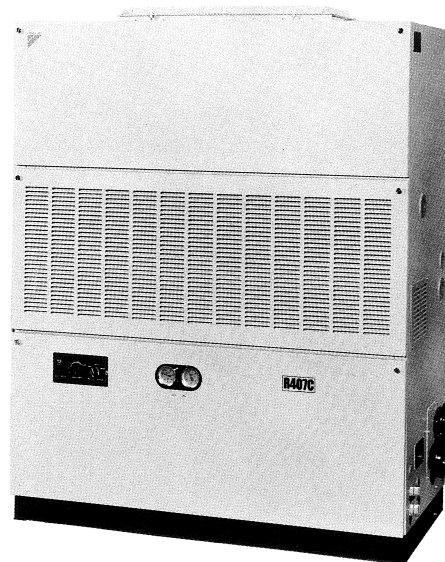
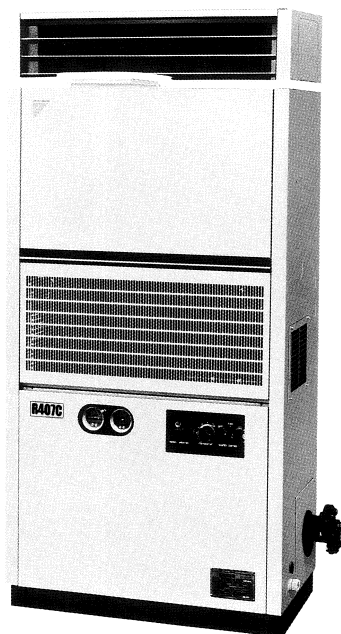
### USP-H Series

**R407C**

**Cooling**

**50Hz : 9.0~60.0kW**

**60Hz : 10.0~67.0kW**



**DAIKIN INDUSTRIES, LTD.**

# **Marine Type Water Cooled Packaged Air Conditioners USP-H Series**

## **Part 1 Marine Type Water Cooled Packaged Air Conditioners**

<b>USP3H~USP20H.....</b>	<b>1</b>
1. Features.....	2
2. Specifications.....	3
3. Accessories .....	4
4. Dimensions .....	5
5. Piping Diagrams.....	11
6. Wiring Diagrams.....	16
7. Capacity Tables .....	19
8. Operation Limit.....	25
9. Fan Performance.....	27
10. Sound Level .....	29
11. Electric Characteristics .....	31
12. Installation.....	32

## **Part 2 Optional Accessories .....33**

1. Plenum Chamber.....	34
2. Heaters .....	36
3. Rear Duct Connection.....	58
4. Fresh Air Intake Duct Connection.....	63
5. Air Discharge Duct Connection (Without Plenum Chamber) .....	65
6. Fan Motor One Size Larger .....	67

# Part 1

# Marine Type Water Cooled Packaged Air Conditioners USP3H~USP20H

<b>USP3H</b>	<b>USP10H</b>
<b>USP5H</b>	<b>USP15H</b>
<b>USP8H</b>	<b>USP20H</b>

1. Features.....	2
1.1 Features.....	2
2. Specifications.....	3
2.1 Specifications.....	3
3. Accessories .....	4
3.1 Standard Accessories.....	4
3.2 Optional Accessories.....	4
3.3 Safety Devices.....	4
4. Dimensions .....	5
4.1 Dimensions .....	5
5. Piping Diagrams.....	11
5.1 Piping Diagrams.....	11
6. Wiring Diagrams.....	16
6.1 Wiring Diagrams.....	16
7. Capacity Tables .....	19
7.1 Cooling Capacity .....	19
8. Operation Limit.....	25
8.1 Operation Limit.....	25
9. Fan Performance.....	27
9.1 Fan Performance.....	27
10. Sound Level .....	29
10.1 Overall Sound Level .....	29
10.2 Octave Band Level .....	30
11. Electric Characteristics .....	31
11.1 Electric Characteristics .....	31
12. Installation.....	32
12.1 Location of Installation.....	32
12.2 Bring in the Unit as Near as Possible to the Position Installed.....	32
12.3 Service Spacing .....	32
12.4 Fixing the Air Conditioner.....	32
12.5 Providing the Drain Piping to the Air Conditioner .....	32
12.6 Piping around the Air Conditioner .....	32

# 1. Features

## 1.1 Features

The Daikin Marine Type Packaged Air Conditioners have been developed with Daikin's own technique and achievements accumulated exclusively in air conditioning for more than half a century, considering special and rigorous conditions on the sea such as intensive vibration due to pitching and rolling of a ship and corrosion caused by sea water and breeze. All the necessary components are compactly encased in a single casing so that limited space in a ship can be used effectively for air conditioning.

The installation work is simple; all you have to do on the site is to provide piping for condenser water and condensation disposal and wiring. All the air conditioners are ready for work only when the power is supplied. The smaller units can be ideally installed in a cabin and engine room, and all the units can be installed easily regardless whether ships are new or old.

The Daikin Marine Type Packaged Air Conditioners ensure comfortable voyage and working on the ship.

### **Use of new refrigerant friendly to earth**

The Daikin Marine Type Packaged Air Conditioners uses the new refrigerant R407C which contains hydro-fluorocarbon (HFC) and of which ODP is zero. This means the new refrigerant is more friendly to the global environment in comparison with the conventional one (HCFC22) of which ODP is 0.055.

### **Careful safety measures**

If the Daikin Marine Type Packaged Air Conditioners are out of order, their operation is automatically stopped by various safety and protective devices listed below before trouble occurs.

- Electric system

Overcurrent relay, compressor thermal protector.

- Refrigerant system

High pressure switch, Low pressure switch, fusible plug or condenser safety valve.

### **Excellent durability**

All the Daikin Marine Type Packaged Air Conditioners are specifically designed in consideration with unique conditions on ships such as bending, torsion, elongation caused by rolling and pitching of ships, corrosion and rust caused by condenser sea water and sea breeze, etc.

- Condenser and its relative parts

Adoption of copper alloy for such parts which are in contact with condenser sea water, naval brass clad steel plate for tube plates, bronze casting for head and rear covers, and aluminum brass for cooling tubes.

- Evaporator and its relative parts

Anti-corrosive treatment on evaporator fins against sea breeze.

- Structure and design

Application of anti-corrosive paint against sea breeze and anti-quake structure.

- Fan and its relative parts

Improvement of bearings and reinforcement of fan frame.

### **Versatile optional accessories are available for easy alteration**

- Fresh air intake duct connection can be attached (USP3H to USP10H)

- An electric heater, etc. can be mounted.

### **Wide operating range**

Even in middle seasons, the units are operative in such a case when cooling is required to cool the heat from engines.

Furthermore, if cooling is required during winter, a stable cooling operation is obtainable only when engine cooling water (Under 38°C) is used. Operating range in high temperature zone can be widened greatly by increasing designed pressure.

### **Excellent serviceability**

In USP3H, the plenum chamber is separated from the unit. So the unit, now only 1,450 mm high, can be installed even in a small space.

Development of the highly efficient and compact heat exchanger makes it possible to reduce charged volume of the refrigerant, which enlarges service spacing in the units and also makes the anti-corrosive galvanized plate free from maintenance. The air filter can be easily removed or mounted.

The mounted compressor is a new high EER hermetically sealed scroll one.

## 2. Specifications

### 2.1 Specifications

Model			USP3H	USP5H	USP8H	USP10H	USP15H	USP20H
*1 Cooling capacity (380/440V)	50/60Hz	kW	9.0/10.0	15.0/17.0	22.4/25.0	30.0/33.5	45.0/50.0	60.0/67.0
		Btu/h	30,700/34,100	51,200/58,000	76,500/85,400	102,400/114,400	153,600/170,700	204,800/228,700
		kcal/h	7,700/8,600	12,900/14,600	19,300/21,500	25,800/28,800	38,700/43,000	51,600/57,600
Capacity steps		%	100-0	100-0	100-0	100-0	100-50-0	100-50-0
Power supply			3 phase, 380-400-415/400-440V, 50/60Hz					
Casing/colour			New light blue					
Compressor			Hermetically sealed scroll type					
No. × Model			1×JT112BF-YE	1×JT150BF-YE	1×JT236DA-YE	1×JT300DA-YE	2×JT236DAYE-T	2×JT300DAYE-T
Speed	50/60Hz	r.p.m	2,900/3,450	2,900/3,450	2,900/3,450	2,900/3,450	2,900/3,450	2,900/3,450
Motor output		kW	3.0×1	3.75×1	5.5×1	7.5×1	5.5×2	7.5×2
Refrigeration oil			DAPHNE FVC68D					
Charge		ℓ	1.35	1.5	2.7	2.7	2.7×2	2.7×2
Condenser			Shell and cross fin tube					
No. × Model			1×CXS1407A-10	1×CXS1410A-5	1×CXS1711A-5	1×CXS1911A-4	1×CXS1914-1	1×CXS2114-2
*1 Water flow rate	50/60Hz	ℓ /min	42/45	71/77	91/98	120/130	207/225	275/300
Evaporator			Cross fin coil					
Evaporator fan			Multi-blade fan					
Model			D1 1½D	2D1 5⁄8A	2D1 5⁄8A	D2D	2D1 ¾G	2D2E
Drive			Belt drive					
Air flow rate	50/60Hz	m³/min	22/27	42/50	50/60	67/80	100/120	135/160
		Cfm	780/950	1,480/1,770	1,770/2,120	2,370/2,820	3,530/4,240	4,770/5,650
External static pressure		50/60Hz Pa	37.3/43.1	32.7/39.2	147/235	196/304	392/588	461/686
Motor output		kW	0.4	0.4	0.75	2.2	3.7	5.5
Refrigerant			R407C					
Charge		kg	2.2	3.5	5	5.9	10	11.8
Control			Thermostatic expansion valve					
No. of circuits			1	1	1	1	1	1
Air filter (Factory set)			Polyvinyl chloride fiber (Washable)					
Thermostat			1 step				2 steps	
Piping connections			1B	1 ½B	1 ½B	2B	2 ½B	2 ½B
Condenser water inlet/outlet (JIS5K flange)								
Drain upper/lower			¾B	1B	1B	1B	1B	1B
Relief port flange			½B	½B	½B	½B	½B (Safety valve)	½B (Safety valve)
Dimensions (H×W×D)		mm	1,472×800×410	1,670×1,050×550	1,680×1,350×600	1,680×1,350×750	1,685×1,600×850	1,685×1,600×850
Machine weight (Operating weight)		kg	165(168)	270(275)	375(383)	440(450)	600(612)	770(786)
Standard accessories			Spare parts			Fuses		
Drawing No.			4D019823A	4D019824A	4D019825A	4D019826A	4D019827A	4D019828A

#### Notes:

- \*1 is based on evaporator entering air temp. 27°C D.B. (68°F D.B.) 19.5°C W. B. (67°F W. B.) and entering condenser water temp. 32°C (90°F).
- Cooling capacity is net capacity which includes a deduction for fan motor heat.

#### Conversion formulae

kcal	= kW × 860
Btu/h	= kW × 3414
Cfm	= m³/min × 35.3

## 3. Accessories

### 3.1 Standard Accessories

- Spare parts
- Fuses

### 3.2 Optional Accessories

MODEL		USP3H	USP5H	USP8H	USP10H	USP15H	USP20H
Plenum chamber		○	○	○	—	—	—
Heater	Electric	○	○	○	○	○	○
	Steam	○	○	○	○	○	○
	Humidifier steam spray	○	○	○	○	○	○
Rear duct connection		—	○	○	○	—	—
Fresh air intake duct conn.		○	○	○	○	—	—
Air discharge duct conn. (without plenum chamber)		○	○	○	*	*	*
Side discharge grill for plenum chamber		○	○	○	—	—	—
Change for piping direction		○	○	○	○	○	○
Fan motor one size larger		○	○	○	*	○	○
Spare parts kit		*	*	*	○	○	○

- Note:** 1. \* means "provided as standard"  
 ○ means "available"  
 — means "not available"
2. Electric heater and steam spray type humidifier cannot be installed together.

### 3.3 Safety Devices

- Safety devices

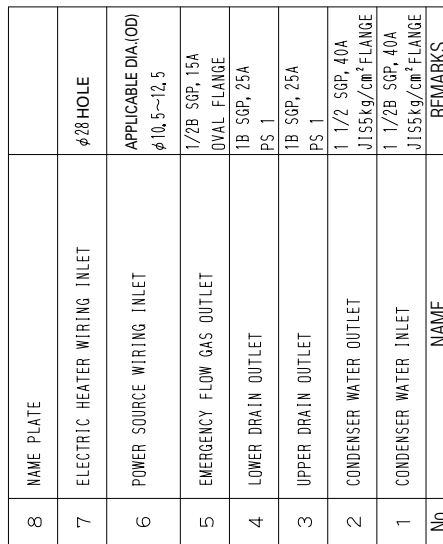
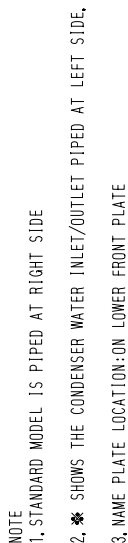
The following safety devices are equipped as standard.

MODEL	USP3H	USP5H	USP8H	USP10H	USP15H	USP20H
Reverse phase protector	○	○	○	○	○	○
Compressor thermal protector	○	○	○	○	○	○
Overcurrent relay (comp.)	○	○	○	○	○	○
Overcurrent relay (fan motor)	○	○	○	○	○	○
High pressure switch	○	○	○	○	○	○
Low pressure switch	○	○	○	○	○	○
Fusible plug	○	○	○	○	—	—
Safety valve	—	—	—	—	○	○
Fuse	○	○	○	○	○	○

- Kinds of Lamp

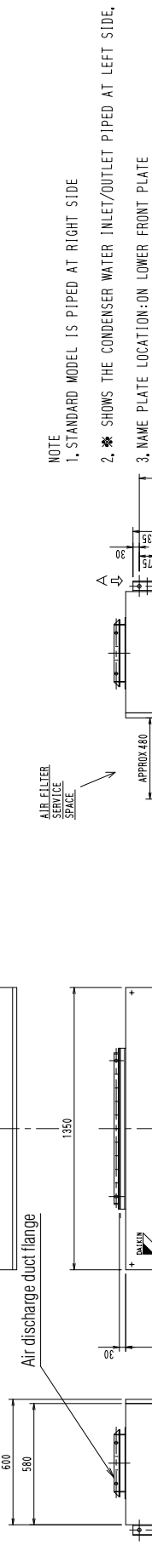
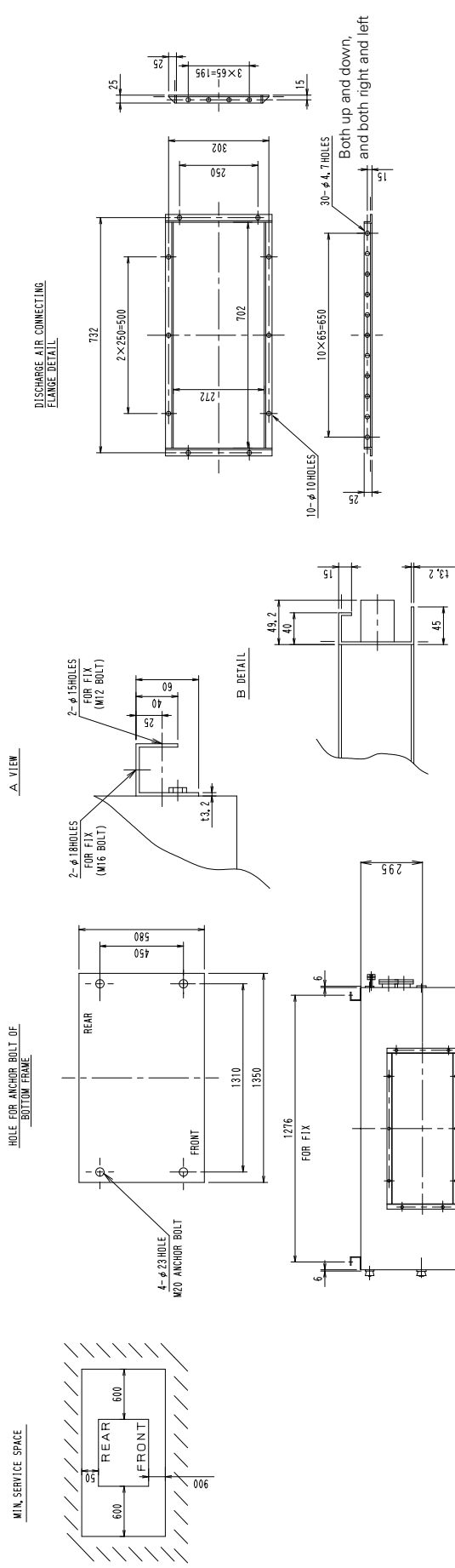
MODEL	USP3H	USP5H	USP8H	USP10H	USP15H	USP20H
Green lamp (for fan operation)	○	○	○	○	○	○







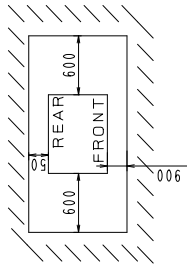
USP8H



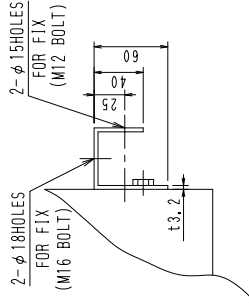
- NOTE
1. STANDARD MODEL IS PIPED AT RIGHT SIDE
  2. ✱ SHOWS THE CONDENSER WATER INLET/OUTLET PIPED AT LEFT SIDE.
  3. NAME PLATE LOCATION: ON LOWER FRONT PLATE

No.	NAME	NAME	REMARKS
8	NAME PLATE		
7	EMERGENCY FLOW GAS OUTLET	φ34 HOLE	
6	POWER SOURCE WIRING INLET	APPLICABLE DIA (OD) φ12.5~14.5	
5	EMERGENCY FLOW GAS OUTLET	1/2B SGP, 15A OVAL FLANGE	
4	LOWER DRAIN OUTLET	1B SGP, 25A PS 1	
3	UPPER DRAIN OUTLET	1B SGP, 25A PS 1	
2	CONDENSER WATER OUTLET	1 1/2 SGP, 40A JIS5kg/cm² FLANGE	
1	CONDENSER WATER INLET	1 1/2B SGP, 40A JIS5kg/cm² FLANGE	

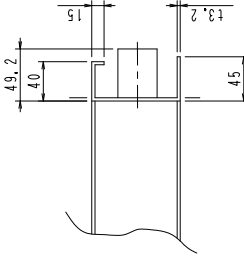
HOLE FOR ANCHOR BOLT OF  
BOTTOM FRAME



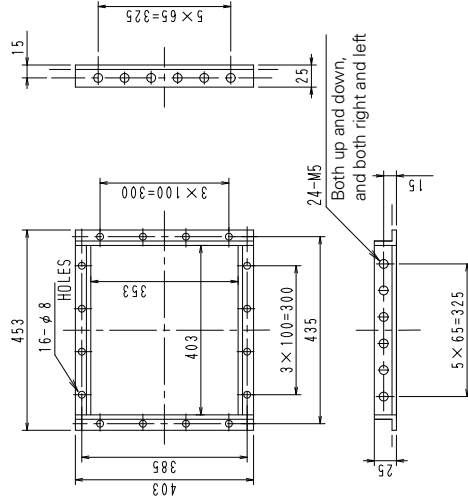
A VIEW



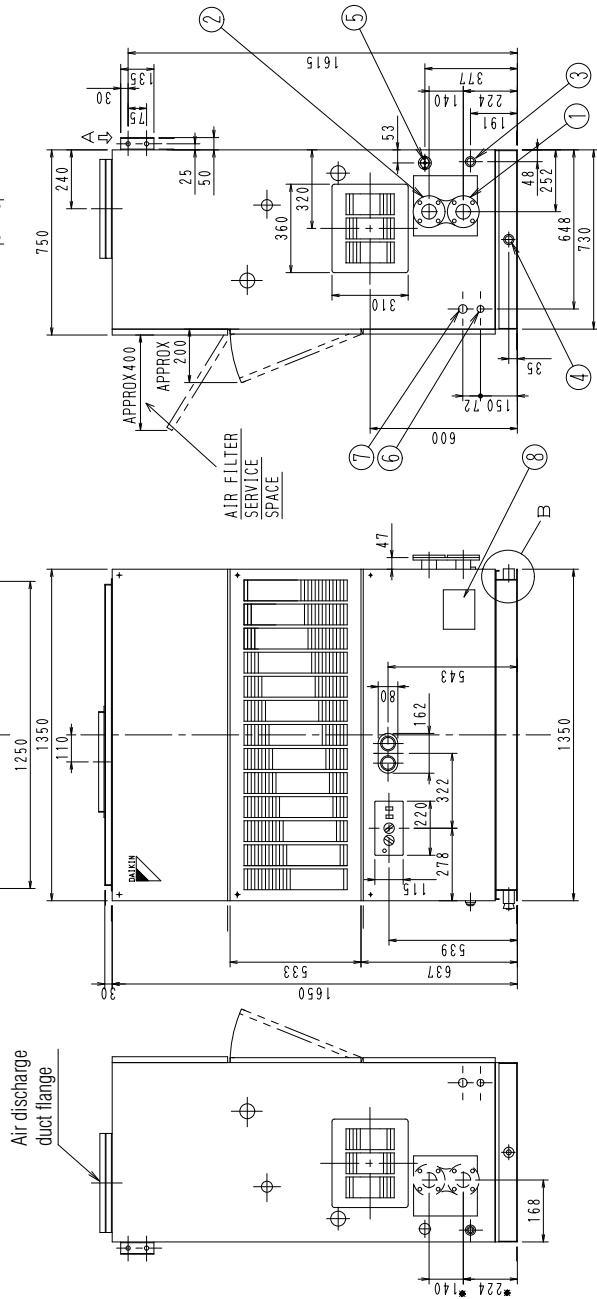
B DETAIL



DISCHARGE AIR CONNECTING  
FLANGE DETAIL



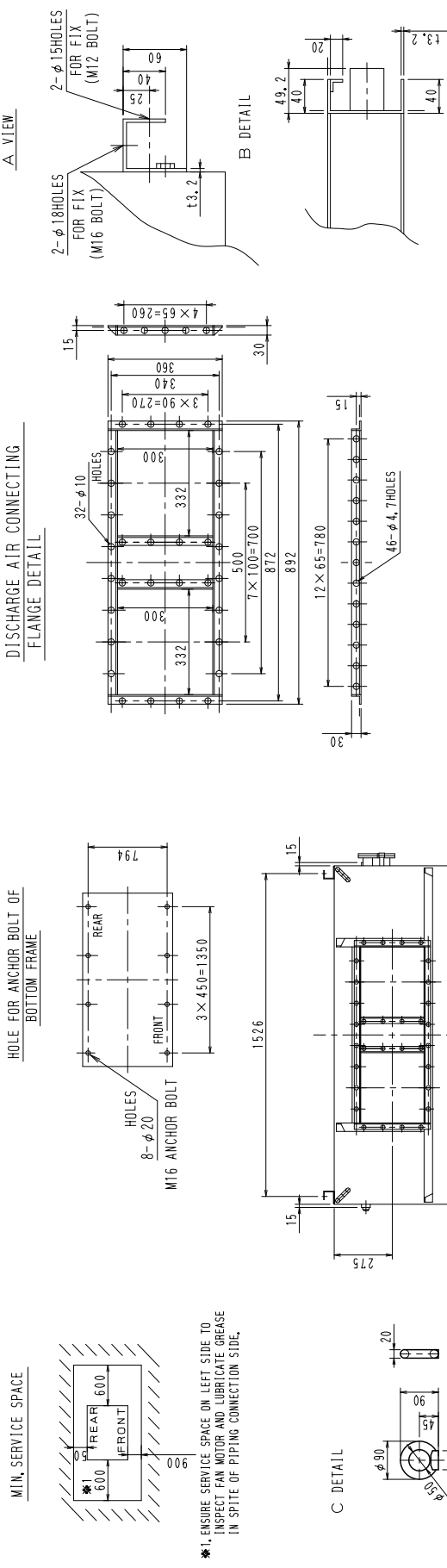
Air discharge  
duct flange



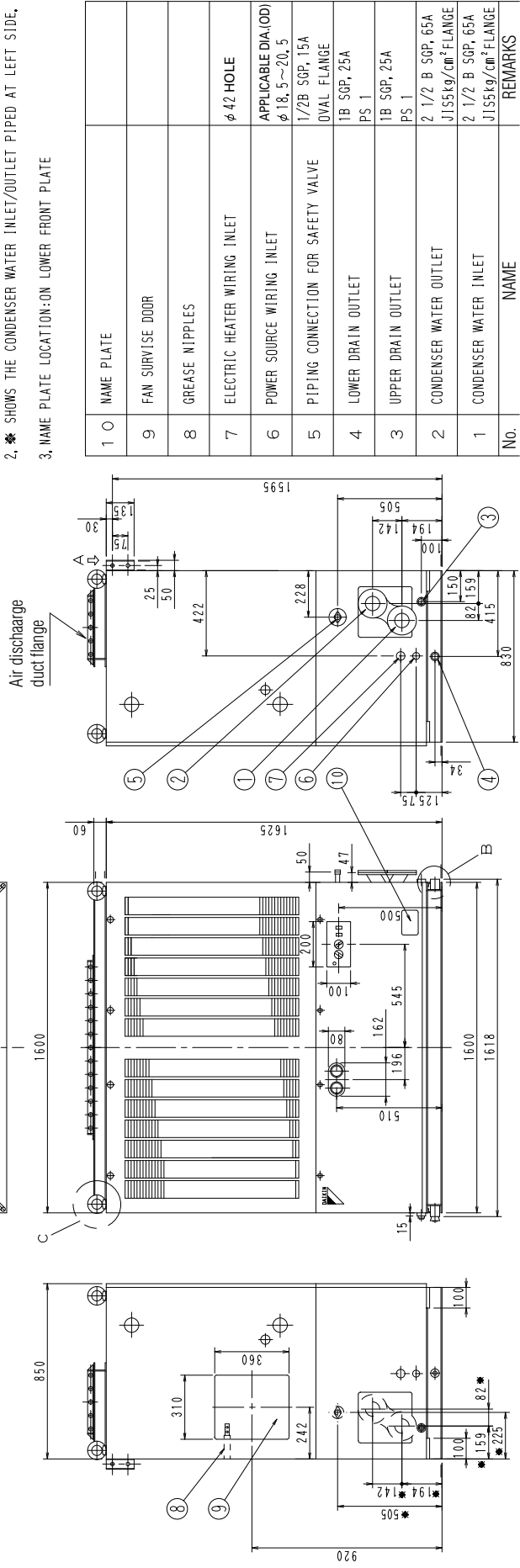
- NOTE
1. STANDARD MODEL IS PIPED AT RIGHT SIDE
  2. \* SHOWS THE CONDENSER WATER INLET/OUTLET PIPED AT LEFT SIDE,
  3. NAME PLATE LOCATION-ON LOWER FRONT PLATE

No.	NAME	NAME	REMARKS
8	NAME PLATE		
7	ELECTRIC HEATER WIRING INLET	φ34 HOLE	
6	POWER SOURCE WIRING INLET	APPLICABLE DIA.(OD) φ14, 5~16, 5	
5	EMERGENCY FLOW GAS OUTLET	1/2B SGP, 15A OVAL FLANGE	
4	LOWER DRAIN OUTLET	1B SGP, 25A PS 1	
3	UPPER DRAIN OUTLET	1B SGP, 25A PS 1	
2	CONDENSER WATER OUTLET	2B SGP, 50A JTS5kg/cm <sup>2</sup> FLANGE	
1	CONDENSER WATER INLET	2B SGP, 50A JTS5kg/cm <sup>2</sup> FLANGE	

USP15H

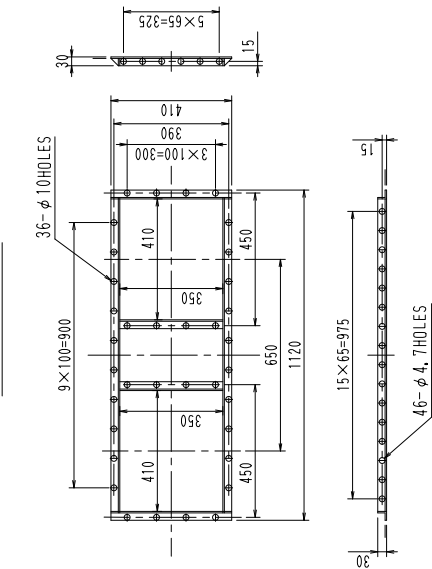


- NOTE
- 1. STANDARD MODEL IS PIPED AT RIGHT SIDE
  - 2. \* SHOWS THE CONDENSER WATER INLET/OUTLET PIPED AT LEFT SIDE.
  - 3. NAME PLATE LOCATION-ON LOWER FRONT PLATE



No.	NAME	REMARKS
1	NAME PLATE	
9	FAN SURVISE DOOR	
8	GREASE NIPPLES	
7	ELECTRIC HEATER WIRING INLET	φ 42 HOLE
6	POWER SOURCE WIRING INLET	APPLICABLE DIA.(OD) φ 18.5~20.5
5	PIPING CONNECTION FOR SAFETY VALVE	1/2B SGP, 15A OVAL FLANGE
4	LOWER DRAIN OUTLET	1B SGP, 25A PS 1
3	UPPER DRAIN OUTLET	1B SGP, 25A PS 1
2	CONDENSER WATER OUTLET	2 1/2 B SGP, 65A JIS5kg/cm <sup>2</sup> FLANGE
1	CONDENSER WATER INLET	2 1/2 B SGP, 65A JIS5kg/cm <sup>2</sup> FLANGE

DISCHARGE AIR CONNECTING  
FLANGE DETAIL

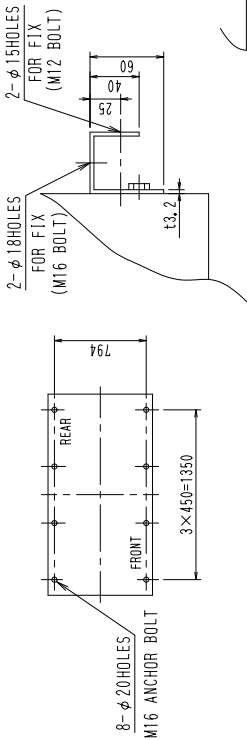


NOTE

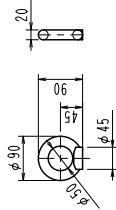
1. STANDARD MODEL IS PIPED AT RIGHT SIDE
2. \* SHOWS THE CONDENSER WATER INLET/OUTLET PIPED AT LEFT SIDE,
3. NAME PLATE LOCATION: ON LOWER FRONT PLATE

A VIEW

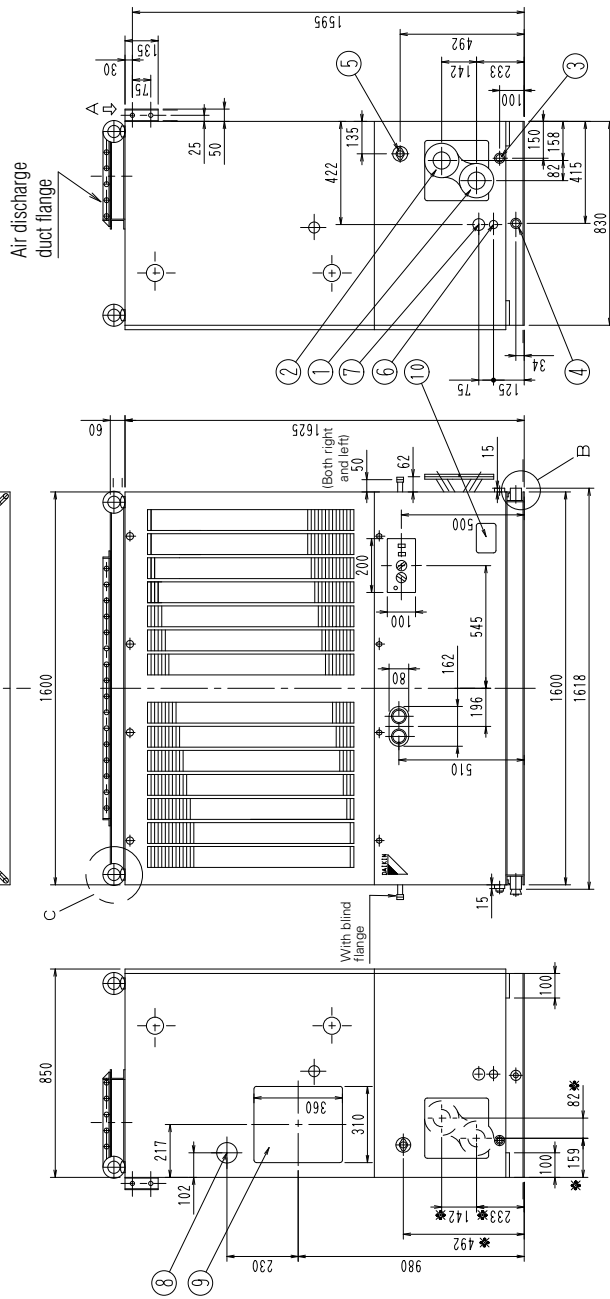
HOLE FOR ANCHOR BOLT OF  
BOTTOM FRAME



C DETAIL



\*1. ENSURE SERVICE SPACE ON LEFT SIDE TO INSPECT FAN MOTOR AND LUBRICATE GREASE IN SPITE OF PIPING CONNECTION SIDE,





















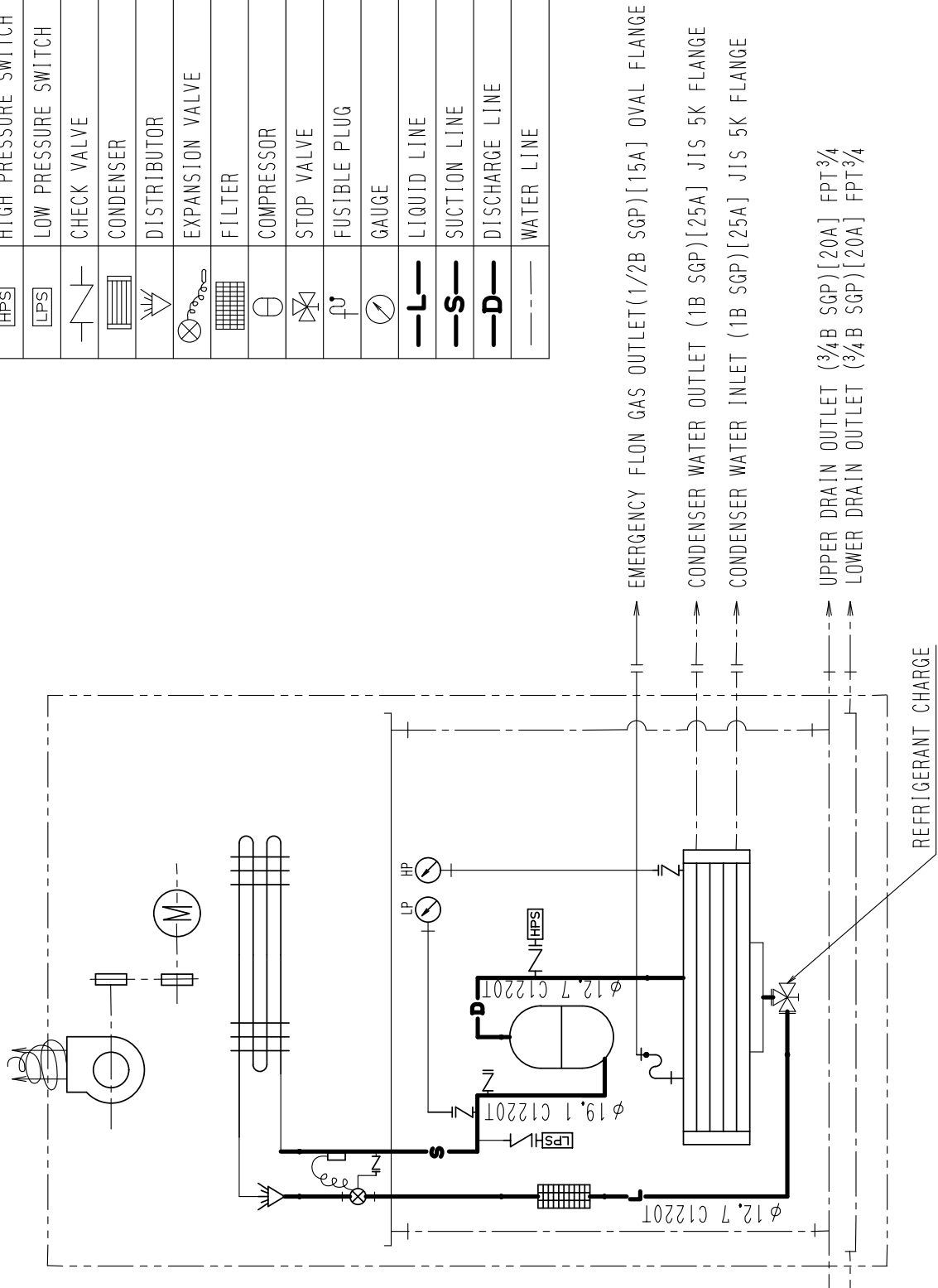
No.	NAME	REMARKS
1	NAME PLATE	
9	FAN SURVIVE DOOR	
8	GREASE NIPPLES	
7	ELECTRIC HEATER WIRING INLET	φ 48 HOLE
6	POWER SOURCE WIRING INLET	APPLICABLE DIA.(OD) φ 20, 5~22, 5
5	PIPING CONNECTION FOR SAFETY VALVE	1/2B SGP, 15A OVAL FLANGE
4	LOWER DRAIN OUTLET	1B SGP, 25A PS 1
3	UPPER DRAIN OUTLET	1B SGP, 25A PS 1
2	CONDENSER WATER OUTLET	2 1/2 B SGP, 65A JT55kg/cm <sup>2</sup> FLANGE
1	CONDENSER WATER INLET	2 1/2 B SGP, 65A JT55kg/cm <sup>2</sup> FLANGE

## 5. Piping Diagrams

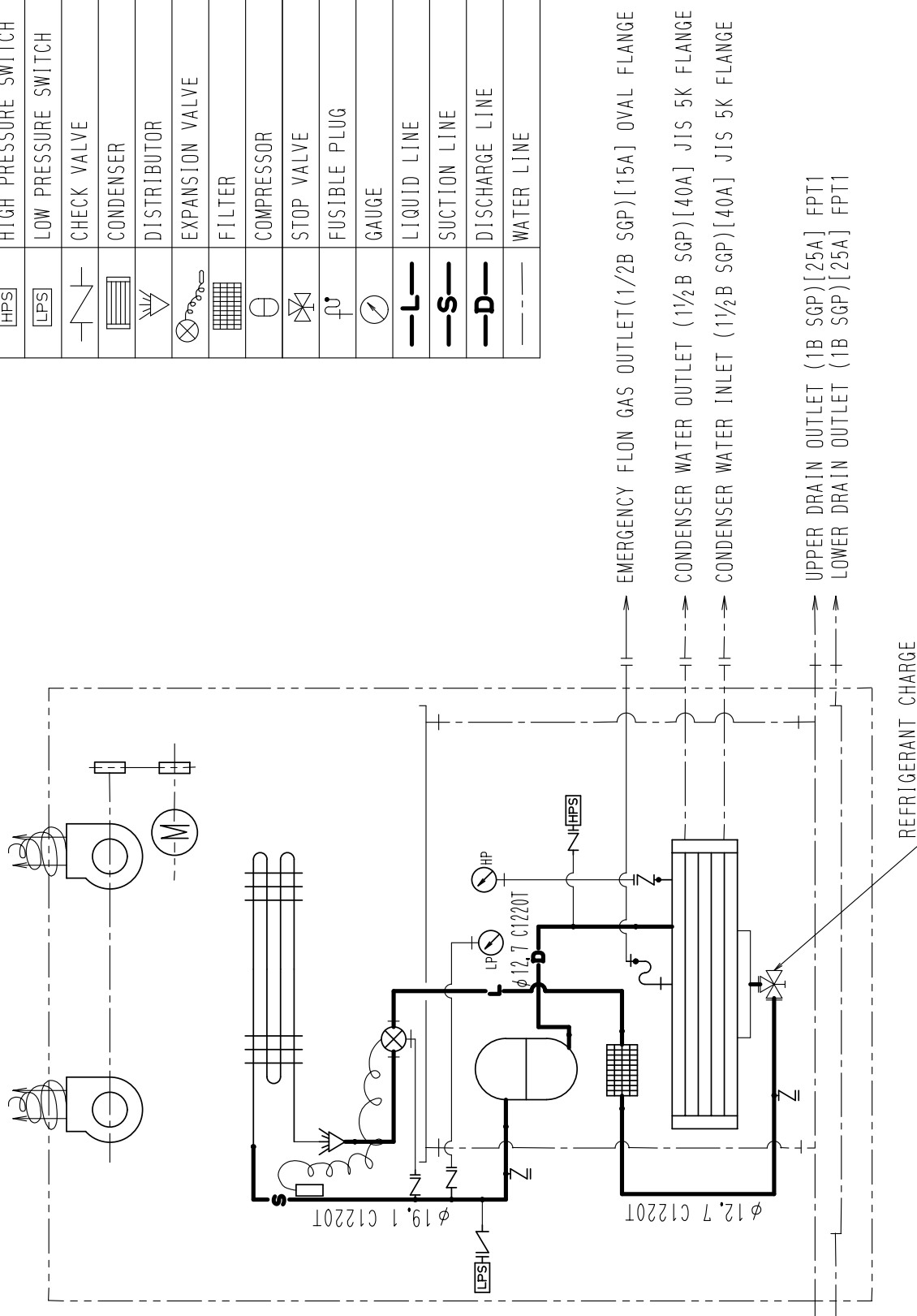
## 5.1 Piping Diagrams

## USP3H

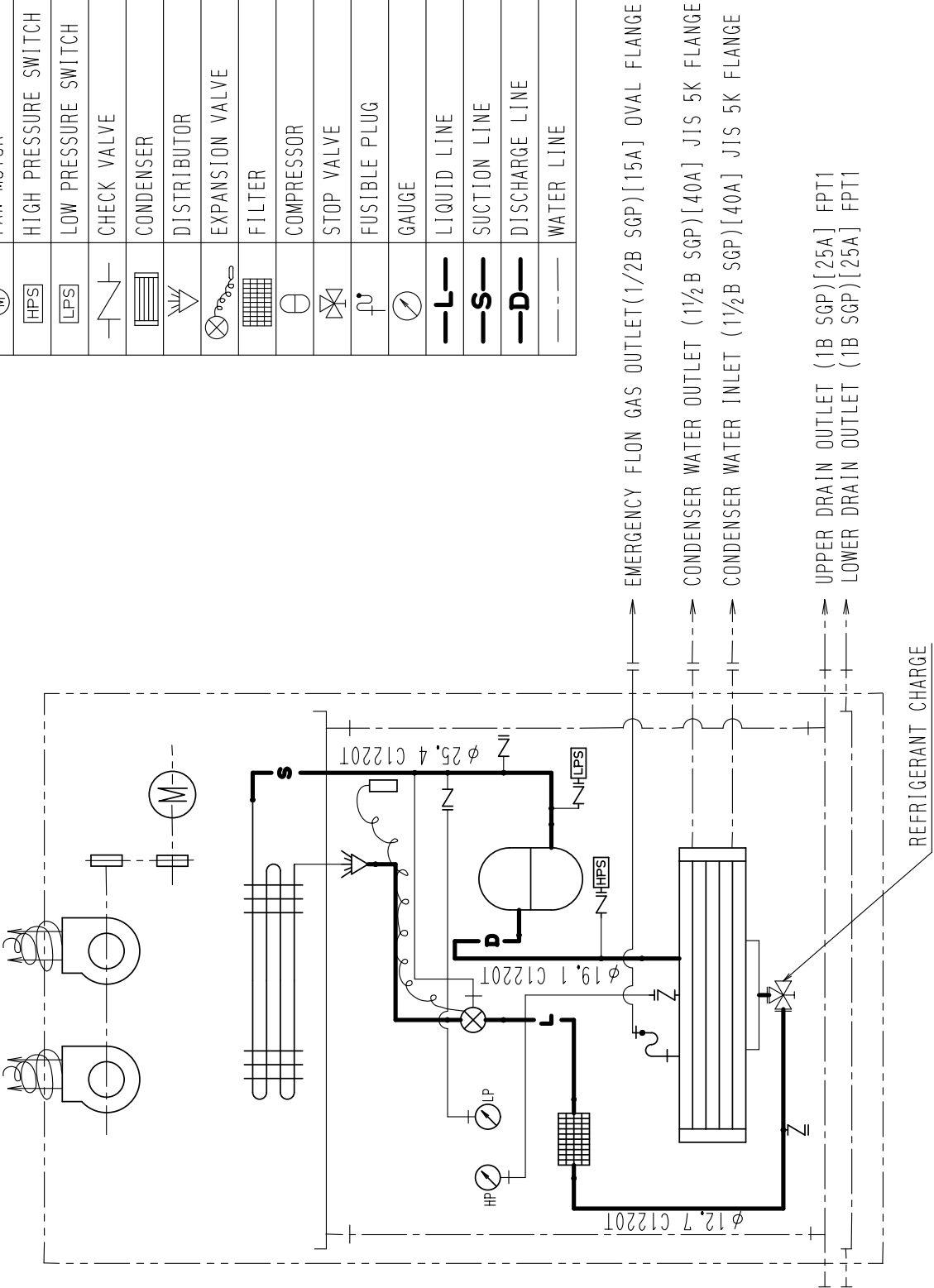
SYMBOL	NAME
	EVAPORATOR
	FAN
	FAN MOTOR
	HIGH PRESSURE SWITCH
	LOW PRESSURE SWITCH
	CHECK VALVE
	CONDENSER
	DISTRIBUTOR
	EXPANSION VALVE
	FILTER
	COMPRESSOR
	STOP VALVE
	FUSIBLE PLUG
	GAUGE
	LIQUID LINE
	SUCTION LINE
	DISCHARGE LINE
	WATER LINE



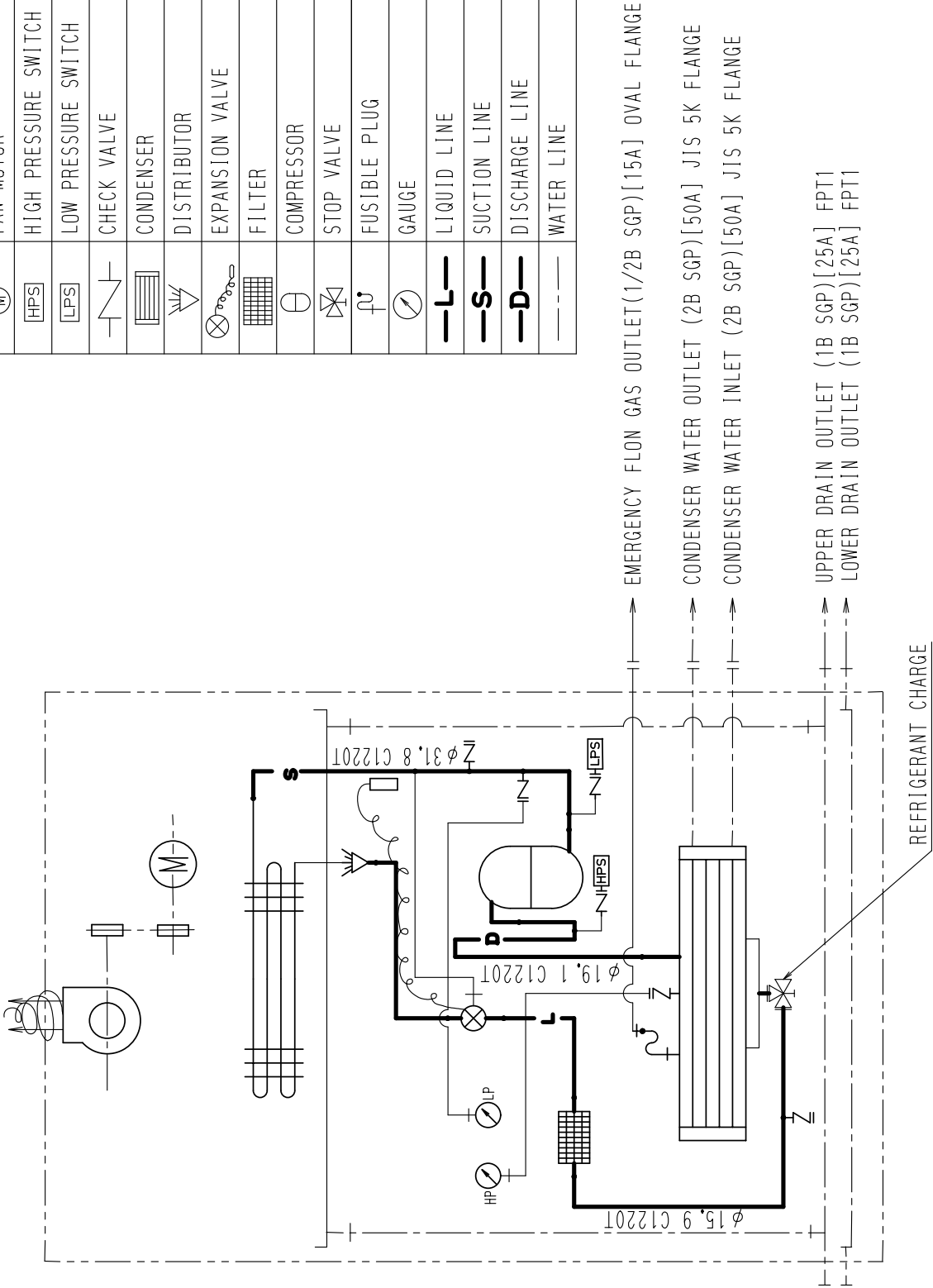
3D0198/3B

3D019874A

SYMBOL	NAME
	EVAPORATOR
	FAN
	FAN MOTOR
	HIGH PRESSURE SWITCH
	LOW PRESSURE SWITCH
	CHECK VALVE
	CONDENSER
	DISTRIBUTOR
	EXPANSION VALVE
	FILTER
	COMPRESSOR
	STOP VALVE
	FUSIBLE PLUG
	GAUGE
	LIQUID LINE
	SUCTION LINE
	DISCHARGE LINE
	WATER LINE



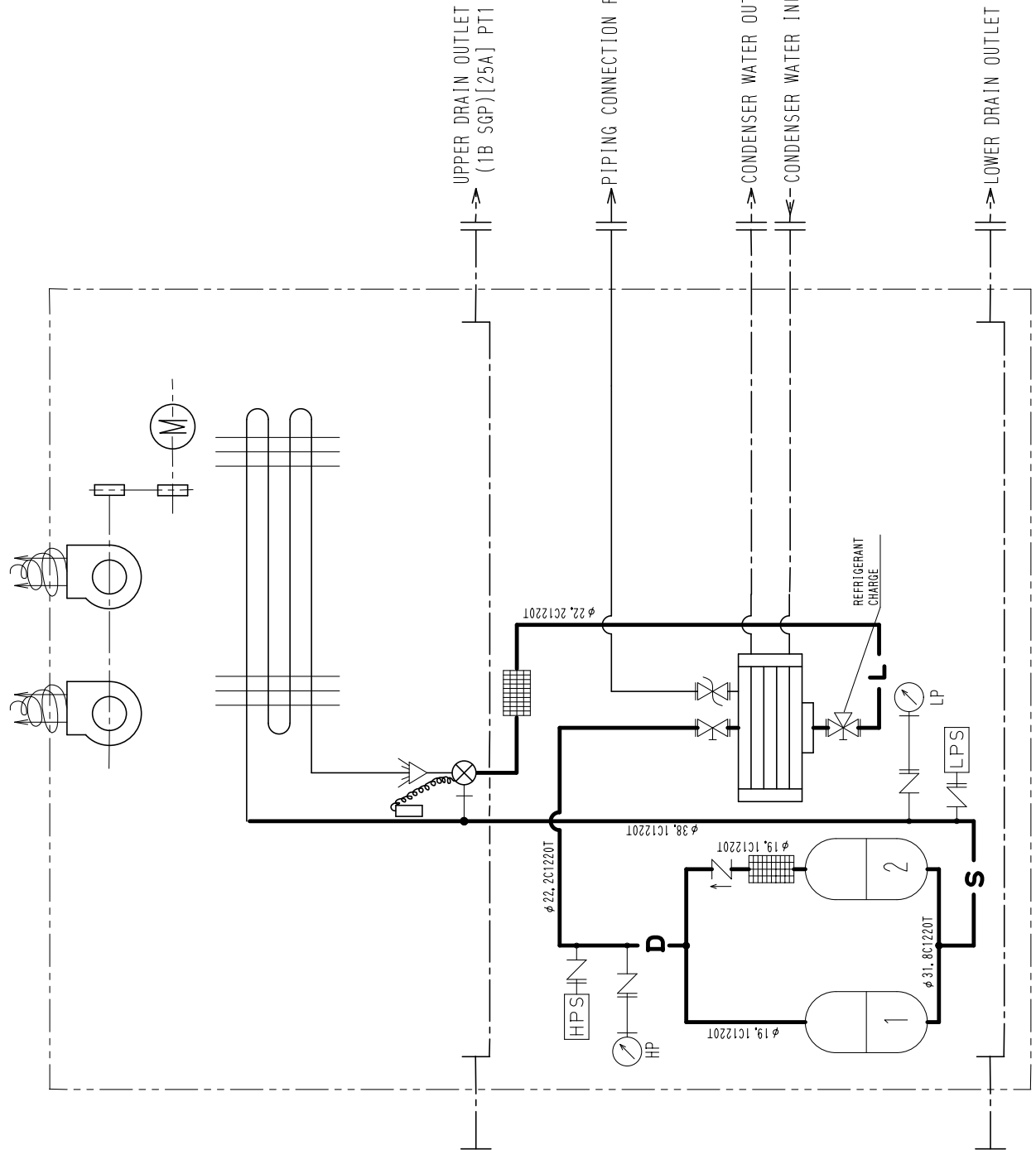
SYMBOL	NAME
	EVAPORATOR
	FAN
	FAN MOTOR
	HIGH PRESSURE SWITCH
	LOW PRESSURE SWITCH
	CHECK VALVE
	CONDENSER
	DISTRIBUTOR
	EXPANSION VALVE
	FILTER
	COMPRESSOR
	STOP VALVE
	FUSIBLE PLUG
	GAUGE
	LIQUID LINE
	SUCTION LINE
	DISCHARGE LINE
	WATER LINE





USP15H  
USP20H

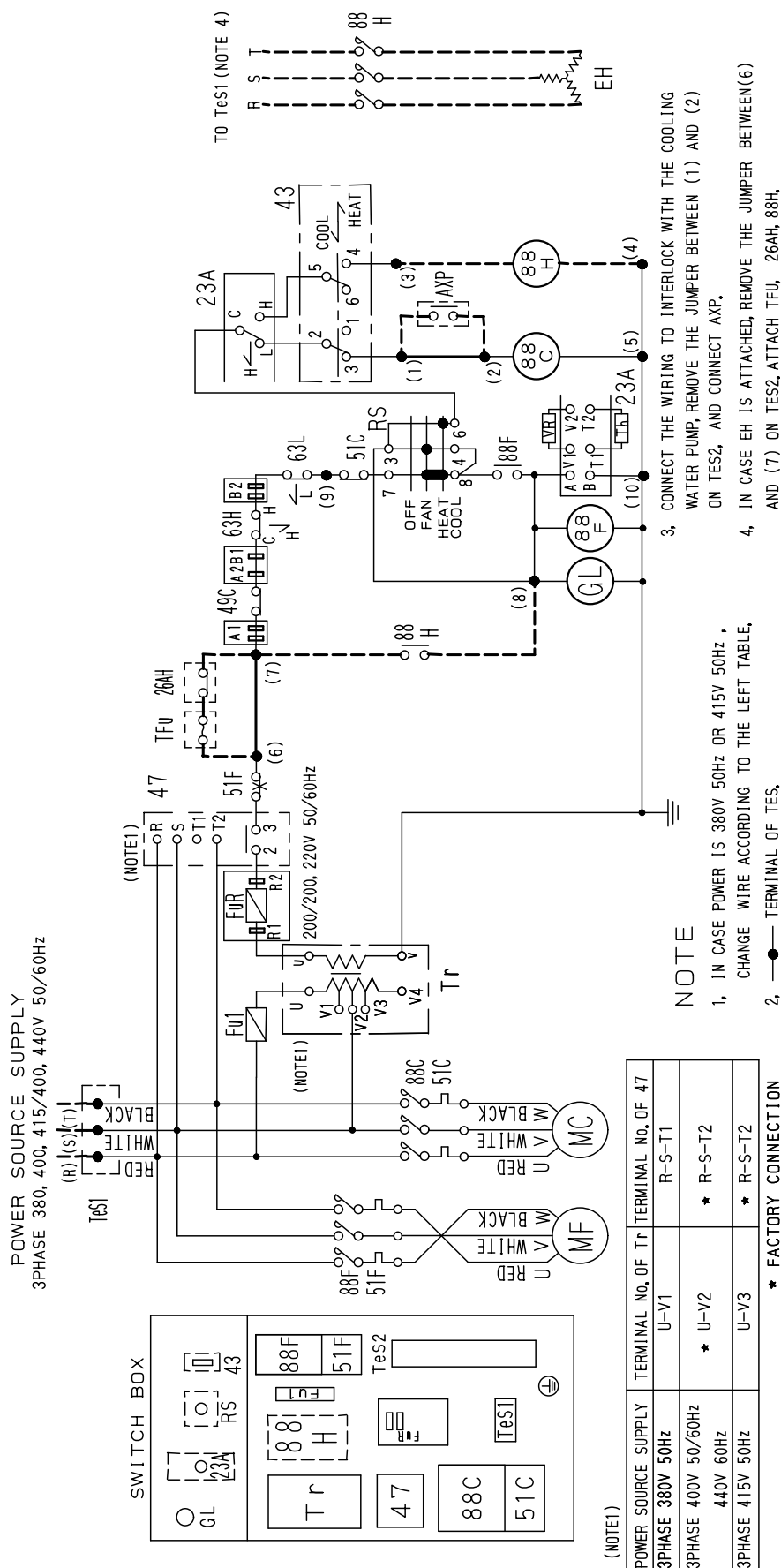
SYMBOL	NAME
	EVAPORATOR
	FAN
	FAN MOTOR
	HIGH PRESSURE SWITCH
	LOW PRESSURE SWITCH
	CHECK VALVE
	CONDENSER
	DISTRIBUTOR
	EXPANSION VALVE
	FILTER
	COMPRESSOR
	STOP VALVE
	SAFETY VALVE
	GAUGE
	LIQUID LINE
	SUCTION LINE
	DISCHARGE LINE
	WATER LINE



## 6. Wiring Diagrams

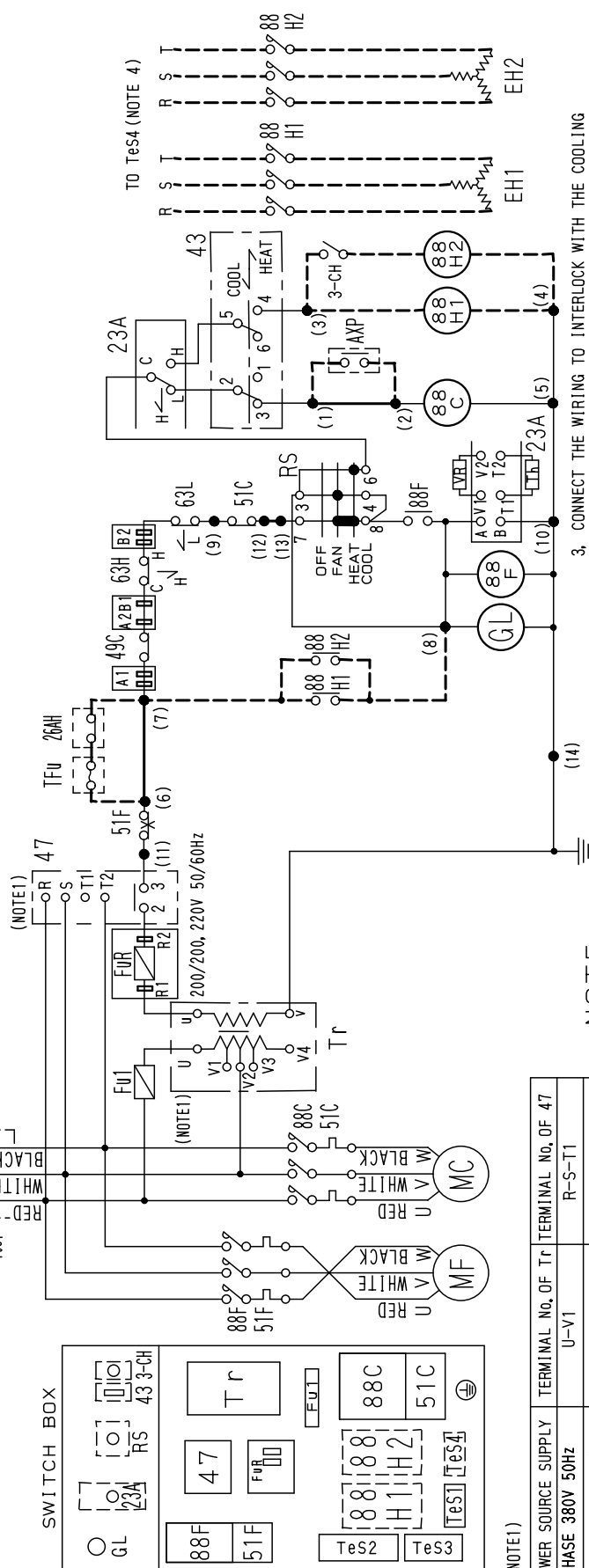
## 6.1 Wiring Diagrams

## USP3H



11-YELLOW	11-	23A	THERMOSTAT	Fu1	FUSE (500V, 3A)	OPTIONAL ACCESSORIES
12-ORANGE	12-	43	SELECTOR SWITCH(HEAT/COOL)	FuR	FUSE (250V, 5A)	26AH THERMO SWITCH (OVER HEAT)
13-PINK		47	PHASE-REVERSAL RELAY	GL	PILOT LAMP (OPERATION-GREEN)	88H MAGNETIC CONTACTOR(EH)
14-WHITE	A1-WHITE	49C	THERMO SWITCH (MC)	MC	MOTOR (COMPRESSOR)	AXP INTERLOCK CONTACT
15-WHITE	A2-BLACK	51C	OVER-CURRENT RELAY (MC)	MF	MOTOR (FAN)	EH ELECTRIC HEATER
16-ORANGE	B1-RED	51F	OVER-CURRENT RELAY (MF)	RS	CONTROL SWITCH	TFu THERMO FUSE (110°C)
17-BLACK	B2-RED	63H	PRESSURE SWITCH (HIGH)	TeS1	TERMINAL STRIP (MAIN CIRCUIT)	
18-RED	R1-RED	63L	PRESSURE SWITCH (LOW)	TeS2	TERMINAL STRIP (CONTROL CIRCUIT)	
19-PINK	R2-RED	88C	MAGNETIC CONTACTOR (MC)	Tr	TRANSFORMER	
20-WHITE		88F	MAGNETIC CONTACTOR (MF)			

3D019887A



## NOTE

1. IN CASE POWER IS 380V 50Hz OR 415V 50Hz ,  
CHANGE WIRE ACCORDING TO THE LEFT TABLE.
2. ● ——— TERMINAL OF TeS, ON TeS2, AND CONNECT AXP.
4. IN CASE EH IS ATTACHED, REMOVE THE JUMPER BETWEEN (6)  
AND (7) ON TeS2, ATTACH TFu, 26AH, 88H1, 88H2, TeS4 AND 3-CH,

POWER SOURCE SUPPLY	TERMINAL No. OF Tr	TERMINAL No. OF 47
3PHASE 380V 50Hz	U-V1	R-S-T1
3PHASE 400V 50/60Hz 440V 60Hz	★ U-V2	★ R-S-T2
3PHASE 415V 50Hz	U-V3	★ R-S-T2

★ FACTORY CONNECTION

11-YELLOW	11-BLUE	23A	THERMOSTAT	Fu1	FUSE (500V, 3A)	OPTIONAL ACCESSORIES
12-ORANGE	12-GRAY	43	SELECTOR SWITCH(HEAT/COOL)	FuR	FUSE (250V, 5A)	26AH THERMO SWITCH (OVER HEAT)
13-PINK	13-PINK	47	PHASE-REVERSAL RELAY	GL	PILOT LAMP (OPERATION-GREEN)	3-CH SELECTOR SWITCH
14-WHITE	14-WHITE	49C	THERMO SWITCH (MC)	MC	MOTOR (COMPRESSOR)	88H1 MAGNETIC CONTACTOR(EH1)
15-WHITE	A1-WHITE	51C	OVER-CURRENT RELAY (MC)	MF	MOTOR (FAN)	88H2 MAGNETIC CONTACTOR(EH2)
16-ORANGE	A2-BLACK	51F	OVER-CURRENT RELAY (MF)	RS	CONTROL SWITCH	AXP INTERLOCK CONTACT
17-BLACK	B1-RED	63H	PRESSURE SWITCH (HIGH)	TeS1	TERMINAL STRIP (MAIN CIRCUIT)	EH1 ELECTRIC HEATER
18-RED	B2-RED	63L	PRESSURE SWITCH (LOW)	TeS2	TERMINAL STRIP (CONTROL CIRCUIT)	EH2 ELECTRIC HEATER
19-PINK	R1-RED	88C	MAGNETIC CONTACTOR (MC)	TeS3	TERMINAL STRIP (CONTROL CIRCUIT)	TeS4 TERMINAL STRIP (MAIN CIRCUIT)
20-WHITE	B2-RED	88F	MAGNETIC CONTACTOR (ME)	Tr	TRANSFORMER	TEU THERMO FUSE (110℃)



## 7. Capacity Tables

### 7.1 Cooling Capacity

USP3H

50Hz

Entering condenser water temp. °C	Condenser water flow rate. ℓ/min	Suction air temp. °W, B.									
		16.0		18.0		19.5		22.0		24.0	
		Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW
14.0	34	8.89	2.04	9.59	2.08	10.2	2.15	11.3	2.25	12.4	2.31
	42	8.99	2.00	9.69	2.04	10.3	2.10	11.4	2.20	12.6	2.26
	50	9.05	1.97	9.76	2.01	10.4	2.07	11.5	2.17	12.7	2.23
20.0	34	8.50	2.19	9.17	2.23	9.72	2.30	10.8	2.40	11.9	2.47
	42	8.59	2.16	9.27	2.21	9.82	2.27	10.9	2.38	12.0	2.44
	50	8.66	2.14	9.34	2.18	9.90	2.25	11.0	2.35	12.1	2.42
24.0	34	8.20	2.31	8.84	2.35	9.38	2.42	10.4	2.54	11.5	2.60
	42	8.27	2.28	8.92	2.33	9.54	2.40	10.5	2.51	11.6	2.58
	50	8.29	2.26	8.95	2.30	9.48	2.37	10.5	2.48	11.6	2.55
28.0	34	8.04	2.40	8.68	2.45	9.20	2.52	10.2	2.64	11.2	2.71
	42	8.12	2.38	8.76	2.42	9.29	2.50	10.3	2.61	11.4	2.69
	50	8.21	2.34	8.85	2.38	9.39	2.45	10.4	2.57	11.5	2.64
32.0	34	7.80	2.54	8.41	2.59	8.92	2.67	9.88	2.80	10.9	2.87
	42	7.87	2.50	8.49	2.55	9.00	2.62	9.97	2.74	11.0	2.82
	50	7.92	2.47	8.58	2.52	9.05	2.59	10.0	2.72	11.1	2.79
38.0	34	7.45	2.69	8.03	2.74	8.51	2.82	9.43	2.95	10.4	3.03
	42	7.54	2.66	8.13	2.71	8.62	2.79	9.55	2.93	10.5	3.01
	50	7.59	2.64	8.19	2.69	8.68	2.77	9.61	2.90	10.6	2.98

Correction factors for capacity and power input, and bypass factor to change in air flow rate.

Air flow rate m³/min		22	24	27	30	33
Correction factor	Capacity	1.00	1.03	1.05	1.07	1.09
	Power input	1.00	1.00	1.00	1.00	1.01
Bypass factor		0.09	0.10	0.11	0.12	0.13

Change of condenser head loss to changes in water flow rate.

Water flow rate ℓ/min	34	42	50
Head loss×10³Pa	9.81	12.7	17.7

Limit of condenser water flow rate. (ℓ/min)

Min.	Standard	Max.
34	42	50

**Note:**

- Figures in   are nominal capacities.
- These capacities are net capacities which include a deduction for cooling for fan motor heat.
- The power input in the table is the total of comp. input and fan motor input.
- Some specifications are subject to change after further development.

J:3D023752

60Hz

Entering condenser water temp. °C	Condenser water flow rate. ℓ/min	Suction air temp. °W, B.									
		16.0		18.0		19.5		22.0		24.0	
		Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW
14.0	36	9.88	2.64	10.7	2.69	11.3	2.77	12.5	2.90	13.8	2.98
	45	10.0	2.58	10.8	2.63	11.4	2.70	12.6	2.83	14.0	2.91
	54	10.1	2.54	10.8	2.60	11.5	2.67	12.7	2.80	14.1	2.88
20.0	36	9.45	2.82	10.2	2.88	10.8	2.96	12.0	3.10	13.2	3.19
	45	9.55	2.79	10.3	2.85	10.9	2.93	12.1	3.07	13.4	3.15
	54	9.62	2.76	10.4	2.81	11.0	2.90	12.2	3.04	13.5	3.12
24.0	36	9.11	2.97	9.83	3.03	10.4	3.12	11.5	3.27	12.7	3.36
	45	9.19	2.94	9.91	3.00	10.6	3.09	11.6	3.24	12.9	3.33
	54	9.22	2.91	9.94	2.97	10.5	3.06	11.7	3.20	12.9	3.29
28.0	36	8.94	3.10	9.64	3.16	10.2	3.25	11.3	3.41	12.5	3.50
	45	9.03	3.07	9.73	3.13	10.3	3.22	11.4	3.37	12.6	3.46
	54	9.12	3.02	9.84	3.08	10.4	3.17	11.6	3.32	12.8	3.41
32.0	36	8.67	3.28	9.35	3.35	9.91	3.44	11.0	3.61	12.1	3.71
	45	8.75	3.22	9.43	3.28	10.0	3.38	11.1	3.54	12.2	3.64
	54	8.80	3.19	9.53	3.25	10.1	3.35	11.1	3.51	12.3	3.60
38.0	36	8.27	3.46	8.92	3.53	9.46	3.64	10.5	3.81	11.6	3.91
	45	8.38	3.43	9.04	3.50	9.58	3.61	10.6	3.78	11.7	3.88
	54	8.43	3.40	9.10	3.47	9.64	3.57	10.7	3.74	11.8	3.85

Correction factors for capacity and power input, and bypass factor to change in air flow rate.

Air flow rate m³/min		22	24	27	30	33
Correction factor	Capacity	1.00	1.03	1.05	1.07	1.09
	Power input	1.00	1.00	1.00	1.00	1.01
Bypass factor		0.09	0.10	0.11	0.12	0.13

Change of condenser head loss to changes in water flow rate.

Water flow rate ℓ/min	36	45	54
Head loss×10³Pa	9.81	14.7	18.0

Limit of condenser water flow rate. (ℓ/min)

Min.	Standard	Max.
36	45	54

**Note:**

- Figures in   are nominal capacities.
- These capacities are net capacities which include a deduction for cooling for fan motor heat.
- The power input in the table is the total of comp. input and fan motor input.
- Some specifications are subject to change after further development.

J:3D023753

# USP5H

## 50Hz

Entering condenser water temp. °C	Condenser water flow rate. ℓ/min	Suction air temp. °C W. B.									
		16.0		18.0		19.5		22.0		24.0	
		Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW
14.0	57	14.6	2.87	15.8	2.95	16.8	3.03	18.7	3.14	20.5	3.21
	71	14.7	2.76	15.9	2.83	17.0	2.90	18.9	3.01	20.7	3.08
	82	14.8	2.76	16.0	2.83	17.0	2.90	18.9	3.01	20.7	3.08
20.0	57	14.1	3.23	15.2	3.32	16.2	3.40	18.0	3.53	19.7	3.61
	71	14.2	3.18	15.4	3.27	16.4	3.35	18.2	3.48	19.9	3.56
	82	14.3	3.09	15.5	3.17	16.4	3.25	18.3	3.37	20.1	3.45
24.0	57	13.7	3.47	14.8	3.56	15.8	3.65	17.5	3.79	19.2	3.88
	71	13.8	3.37	14.9	3.46	15.9	3.55	17.7	3.68	19.4	3.77
	82	14.0	3.28	15.1	3.36	16.1	3.45	17.9	3.58	19.6	3.67
28.0	57	13.3	3.66	14.4	3.75	15.3	3.85	17.0	3.99	18.7	4.09
	71	13.4	3.62	14.5	3.71	15.4	3.81	17.1	3.95	18.8	4.05
	82	13.6	3.56	14.7	3.66	15.6	3.75	17.4	3.89	19.0	3.98
32.0	57	12.9	3.90	13.9	4.00	14.8	4.10	16.5	4.25	18.1	4.36
	71	13.1	3.80	14.1	3.90	15.0	4.00	16.7	4.15	18.3	4.25
	82	13.1	3.75	14.2	3.85	15.1	3.95	16.8	4.10	18.4	4.19
38.0	57	12.2	4.18	13.2	4.29	14.1	4.40	15.7	4.57	17.2	4.68
	71	12.4	4.09	13.4	4.19	14.3	4.30	15.9	4.46	17.4	4.57
	82	12.5	4.04	13.5	4.14	14.4	4.25	16.0	4.41	17.5	4.52

### Note:

- Figures in  are nominal capacities.
- These capacities are net capacities which include a deduction for cooling for fan motor heat.
- The power input in the table is the total of comp. input and fan motor input.
- Some specifications are subject to change after further development.

Change of condenser head loss to changes in water flow rate.

Water flow rate ℓ/min	57	71	82
Head loss×10³Pa	12.1	18.6	24.1

Correction factors for capacity and power input, and bypass factor to change in air flow rate.

Air flow rate m³/min		34	38	42	46	50	55	60
Correction factor	Capacity	0.93	0.97	1.00	1.03	1.05	1.08	1.10
	Power input	0.98	0.99	1.00	1.01	1.01	1.02	1.02
Bypass factor		0.13	0.15	0.16	0.17	0.18	0.19	0.20

Limit of condenser water flow rate.  
(ℓ/min)

Min.	Standard	Max.
57	71	82

J:3D023754

## 60Hz

Entering condenser water temp. °C	Condenser water flow rate. ℓ/min	Suction air temp. °C W. B.									
		16.0		18.0		19.5		22.0		24.0	
		Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW
14.0	62	16.3	3.82	17.6	3.90	18.6	4.01	20.6	4.20	22.5	4.32
	77	16.4	3.73	17.7	3.81	18.7	3.92	20.7	4.11	22.6	4.22
	82	16.5	3.69	17.8	3.76	18.8	3.87	20.9	4.06	22.8	4.17
20.0	62	15.8	4.09	17.1	4.17	18.1	4.29	20.1	4.50	21.9	4.62
	77	15.9	4.04	17.2	4.12	18.2	4.25	20.2	4.45	22.0	4.57
	82	16.0	4.00	17.3	4.08	18.3	4.20	20.3	4.40	22.1	4.52
24.0	62	15.5	4.31	16.7	4.40	17.7	4.53	19.6	4.74	21.4	4.87
	77	15.6	4.27	16.8	4.35	17.9	4.48	19.8	4.69	21.6	4.82
	82	15.7	4.22	16.9	4.31	17.9	4.43	19.8	4.64	21.7	4.77
28.0	62	15.1	4.49	16.3	4.58	17.3	4.71	19.2	4.94	20.9	5.07
	77	15.3	4.44	16.5	4.53	17.5	4.67	19.3	4.89	21.1	5.02
	82	15.4	4.43	16.6	4.52	17.6	4.66	19.5	4.88	21.3	5.01
32.0	62	14.7	4.76	15.9	4.85	16.8	4.99	18.7	5.23	20.4	5.37
	77	14.9	4.67	16.0	4.76	17.0	4.90	18.8	5.13	20.6	5.27
	82	15.0	4.62	16.1	4.71	17.1	4.85	18.9	5.08	20.7	5.22
38.0	62	14.1	5.02	15.2	5.12	16.1	5.27	17.8	5.52	19.4	5.68
	77	14.2	4.98	15.4	5.08	16.3	5.23	18.0	5.48	19.7	5.62
	82	14.3	4.93	15.5	5.03	16.4	5.18	18.2	5.43	19.8	5.57

### Note:

- Figures in  are nominal capacities.
- These capacities are net capacities which include a deduction for cooling for fan motor heat.
- The power input in the table is the total of comp. input and fan motor input.
- Some specifications are subject to change after further development.

Change of condenser head loss to changes in water flow rate.

Water flow rate ℓ/min	62	77	82
Head loss×10³Pa	14.7	21.6	24.1

Correction factors for capacity and power input, and bypass factor to change in air flow rate.

Air flow rate m³/min		34	38	42	46	50	55	60
Correction factor	Capacity	0.87	0.91	0.95	0.97	1.00	1.03	1.05
	Power input	0.96	0.97	0.98	0.99	1.00	1.01	1.01
Bypass factor		0.13	0.15	0.16	0.17	0.18	0.19	0.20

Limit of condenser water flow rate.  
(ℓ/min)

Min.	Standard	Max.
62	77	82

J:3D023755

# USP8H

## 50Hz

Entering condenser water temp. °C	Condenser water flow rate. ℓ/min	Suction air temp. °W. B.									
		16.0		18.0		19.5		22.0		24.0	
		Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW
14.0	73	21.5	5.12	23.3	5.20	24.8	5.29	27.7	5.37	30.4	5.46
	91	21.8	5.02	23.6	5.11	25.1	5.19	28.0	5.27	30.8	5.36
	109	21.9	4.97	23.7	5.05	25.2	5.14	28.2	5.22	31.0	5.30
20.0	73	20.7	5.06	22.5	5.46	23.9	5.46	26.7	5.63	29.4	5.71
	91	21.0	5.27	22.7	5.36	24.2	5.36	27.0	5.52	29.7	5.61
	109	21.1	4.95	22.9	5.30	24.3	5.30	27.2	5.47	29.9	5.55
24.0	73	20.3	5.46	22.0	5.63	23.4	5.71	26.1	5.88	28.7	6.06
	91	20.5	5.36	22.2	5.52	23.7	5.61	26.4	5.78	29.0	5.94
	109	20.7	5.30	22.4	5.47	23.8	5.55	26.6	5.72	29.2	5.88
28.0	73	19.8	5.48	21.4	5.56	22.8	5.97	25.4	5.89	27.9	6.05
	91	20.0	5.38	21.6	5.46	23.0	5.86	25.7	5.78	28.3	5.94
	109	20.1	5.32	21.8	5.40	23.2	5.80	25.9	5.72	28.4	5.88
32.0	73	19.3	5.88	20.8	6.06	22.1	6.23	24.7	6.48	27.2	6.74
	91	19.4	5.78	21.1	5.94	22.4	6.11	25.0	6.36	27.5	6.61
	109	19.6	5.72	21.2	5.88	22.5	6.05	25.1	6.30	27.7	6.55
38.0	73	18.4	6.31	19.9	6.48	21.2	6.65	23.7	6.99	26.1	7.16
	91	18.7	6.19	20.2	6.36	21.5	6.53	24.0	6.86	26.4	7.03
	109	18.8	6.13	20.3	6.30	21.6	6.46	24.1	6.79	26.6	6.96

### Note:

- Figures in  are nominal capacities.
- These capacities are net capacities which include a deduction for cooling for fan motor heat.
- The power input in the table is the total of comp. input and fan motor input.
- Some specifications are subject to change after further development.

Change of condenser head loss to changes in water flow rate.

Water flow rate ℓ/min	73	91	109
Head loss×10 <sup>3</sup> Pa	8.44	11.8	16.1

Correction factors for capacity and power input, and bypass factor to change in air flow rate.

Air flow rate m <sup>3</sup> /min		40	45	50	55	60	65	70
Correction factor	Capacity	0.91	0.96	1.00	1.03	1.06	1.09	1.11
	Power input	0.97	0.99	1.00	1.01	1.02	1.02	1.03
Bypass factor		0.04	0.04	0.05	0.06	0.06	0.07	0.07

Limit of condenser water flow rate.  
(ℓ/min)

Min.	Standard	Max.
73	91	109

J:3D023756

## 60Hz

Entering condenser water temp. °C	Condenser water flow rate. ℓ/min	Suction air temp. °W. B.									
		16.0		18.0		19.5		22.0		24.0	
		Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW
14.0	78	24.0	6.79	26.0	6.91	27.7	7.02	30.9	7.13	34.0	7.25
	98	24.3	6.67	26.3	6.78	28.0	6.89	31.2	7.00	34.4	7.11
	118	24.4	6.60	26.5	6.71	28.2	6.82	31.4	6.93	34.6	7.04
20.0	78	23.2	6.72	25.1	7.25	26.7	7.25	29.8	7.47	32.8	7.58
	98	23.4	7.00	25.4	7.11	27.0	7.11	30.1	7.33	33.2	7.44
	118	23.6	6.57	25.5	7.04	27.2	7.04	30.3	7.26	33.4	7.37
24.0	78	22.6	7.25	24.5	7.47	26.1	7.58	29.1	7.81	32.0	8.04
	98	22.9	7.11	24.8	7.33	26.4	7.44	29.5	7.67	32.4	7.89
	118	23.1	7.04	25.0	7.26	26.6	7.37	29.6	7.59	32.6	7.81
28.0	78	22.1	7.27	23.9	7.38	25.4	7.92	28.3	7.82	31.2	8.03
	98	22.3	7.14	24.2	7.24	25.7	7.78	28.7	7.67	31.6	7.88
	118	22.5	7.07	24.3	7.17	25.9	7.70	28.9	7.59	31.7	7.80
32.0	78	21.5	7.81	23.2	8.04	24.7	8.26	27.6	8.60	30.3	8.94
	98	21.7	7.67	23.5	7.89	25.0	8.11	27.9	8.44	30.7	8.78
	118	21.8	7.59	23.6	7.81	25.1	8.03	28.1	8.36	30.9	8.69
38.0	78	20.5	8.38	22.2	8.60	23.7	8.83	26.5	9.28	29.2	9.51
	98	20.8	8.22	22.5	8.44	24.0	8.67	26.8	9.11	29.5	9.33
	118	21.0	8.14	22.6	8.36	24.1	8.58	26.9	9.02	29.6	9.24

### Note:

- Figures in  are nominal capacities.
- These capacities are net capacities which include a deduction for cooling for fan motor heat.
- The power input in the table is the total of comp. input and fan motor input.
- Some specifications are subject to change after further development.

Change of condenser head loss to changes in water flow rate.

Water flow rate ℓ/min	78	98	118
Head loss×10 <sup>3</sup> Pa	9.42	13.7	18.5

Correction factors for capacity and power input, and bypass factor to change in air flow rate.

Air flow rate m <sup>3</sup> /min		40	45	50	55	60	65	70
Correction factor	Capacity	0.85	0.90	0.94	0.97	1.00	1.03	1.05
	Power input	0.94	0.96	0.98	0.99	1.00	1.01	1.02
Bypass factor		0.04	0.04	0.05	0.06	0.06	0.07	0.07

Limit of condenser water flow rate.  
(ℓ/min)

Min.	Standard	Max.
78	98	118

J:3D023757

# USP10H

## 50Hz

Entering condenser water temp. °C	Condenser water flow rate. ℓ/min	Suction air temp. °W. B.									
		16.0		18.0		19.5		22.0		24.0	
		Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW
14.0	96	29.2	6.24	31.6	6.41	33.6	6.57	37.4	6.82	41.0	6.98
	120	29.5	5.99	31.9	6.14	33.9	6.30	37.7	6.54	41.4	6.69
	144	29.6	5.90	32.0	6.06	34.0	6.21	37.8	6.45	41.5	6.60
20.0	96	28.1	7.02	30.4	7.20	32.3	7.39	36.0	7.66	39.5	7.85
	120	28.4	6.91	30.7	7.10	32.7	7.28	36.4	7.55	39.9	7.73
	144	28.6	6.71	30.9	6.88	32.9	7.06	36.6	7.33	40.1	7.50
24.0	96	27.4	7.53	29.6	7.73	31.5	7.93	35.1	8.23	38.4	8.43
	120	27.7	7.33	29.9	7.52	31.8	7.71	35.4	8.00	38.8	8.19
	144	27.9	7.12	30.2	7.31	32.1	7.50	35.7	7.78	39.2	7.96
28.0	96	26.6	7.95	28.8	8.16	30.6	8.36	34.1	8.68	37.3	8.89
	120	26.8	7.86	29.0	8.07	30.8	8.28	34.3	8.59	37.6	8.79
	144	27.1	7.74	29.3	7.94	31.2	8.15	34.7	8.45	38.1	8.66
32.0	96	25.8	8.46	27.8	8.68	29.6	8.91	33.0	9.24	36.1	9.46
	120	26.1	8.26	28.2	8.47	30.0	8.69	33.4	9.02	36.6	9.23
	144	26.3	8.15	28.4	8.36	30.2	8.58	33.6	8.90	36.8	9.11
38.0	96	24.5	9.08	26.5	9.32	28.1	9.56	31.3	9.92	34.3	10.2
	120	24.8	8.87	26.8	9.11	28.5	9.34	31.7	9.69	34.8	9.93
	144	25.0	8.77	27.0	9.00	28.8	9.23	32.0	9.58	35.1	9.81

### Note:

- Figures in   are nominal capacities.
- These capacities are net capacities which include a deduction for cooling for fan motor heat.
- The power input in the table is the total of comp. input and fan motor input.
- Some specifications are subject to change after further development.

Change of condenser head loss to changes in water flow rate.

Water flow rate ℓ/min	96	<span style="border: 1px solid black; padding: 0 2px;">120</span>	144
Head loss×10 <sup>3</sup> Pa	9.16	<span style="border: 1px solid black; padding: 0 2px;">13.7</span>	18.6

Correction factors for capacity and power input, and bypass factor to change in air flow rate.

Air flow rate m <sup>3</sup> /min		57	60	67	80	90	96
Correction factor	Capacity	0.94	0.96	1.00	1.06	1.10	1.11
	Power input	0.98	0.99	1.00	1.02	1.03	1.04
Bypass factor		0.05	0.06	0.07	0.08	0.09	0.09

Limit of condenser water flow rate.  
(ℓ/min)

Min.	Standard	Max.
96	<span style="border: 1px solid black; padding: 0 2px;">120</span>	144

J:3D023758

## 60Hz

Entering condenser water temp. °C	Condenser water flow rate. ℓ/min	Suction air temp. °W. B.									
		16.0		18.0		19.5		22.0		24.0	
		Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW
14.0	104	32.1	8.89	34.6	9.07	36.7	9.34	40.6	9.78	44.4	10.0
	130	32.3	8.69	34.8	8.86	36.9	9.12	40.9	9.55	44.6	9.81
	156	32.4	8.58	35.0	8.75	37.1	9.01	41.1	9.44	44.9	9.70
20.0	104	31.2	9.51	33.7	9.70	35.7	10.0	39.5	10.5	43.2	10.7
	130	31.4	9.41	33.9	9.60	35.9	9.88	39.8	10.3	43.4	10.6
	156	31.6	9.31	34.1	9.49	36.1	9.77	40.0	10.2	43.6	10.5
24.0	104	30.5	10.0	32.9	10.2	34.9	10.5	38.7	11.0	42.2	11.3
	130	30.8	9.93	33.2	10.1	35.2	10.4	39.0	10.9	42.6	11.2
	156	30.9	9.82	33.3	10.0	35.3	10.3	39.1	10.8	42.7	11.1
28.0	104	29.8	10.4	32.2	10.7	34.1	11.0	37.8	11.5	41.2	11.8
	130	30.1	10.3	32.4	10.5	34.4	10.9	38.1	11.4	41.6	11.7
	156	30.2	10.2	32.5	10.4	34.5	10.7	38.2	11.2	41.7	11.5
32.0	104	29.0	11.1	31.3	11.3	33.2	11.6	36.8	12.2	40.1	12.5
	130	29.3	10.9	31.6	11.1	<span style="border: 1px solid black; padding: 0 2px;">33.5</span>	<span style="border: 1px solid black; padding: 0 2px;">11.4</span>	37.1	11.9	40.5	12.3
	156	29.5	10.7	31.8	11.0	33.7	11.3	37.3	11.8	40.7	12.1
38.0	104	27.7	11.7	29.9	11.9	31.7	12.3	35.1	12.9	38.3	13.2
	130	28.1	11.6	30.3	11.8	32.1	12.2	35.6	12.7	38.8	13.1
	156	28.3	11.5	30.5	11.7	32.3	12.1	35.8	12.6	39.1	13.0

### Note:

- Figures in   are nominal capacities.
- These capacities are net capacities which include a deduction for cooling for fan motor heat.
- The power input in the table is the total of comp. input and fan motor input.
- Some specifications are subject to change after further development.

Change of condenser head loss to changes in water flow rate.

Water flow rate ℓ/min	104	<span style="border: 1px solid black; padding: 0 2px;">130</span>	156
Head loss×10 <sup>3</sup> Pa	10.5	<span style="border: 1px solid black; padding: 0 2px;">15.7</span>	20.7

Correction factors for capacity and power input, and bypass factor to change in air flow rate.

Air flow rate m <sup>3</sup> /min		57	60	70	80	90	96
Correction factor	Capacity	0.88	0.90	0.96	1.00	1.04	1.05
	Power input	0.95	0.96	0.98	1.00	1.01	1.02
Bypass factor		0.05	0.06	0.07	0.08	0.09	0.09

Limit of condenser water flow rate.  
(ℓ/min)

Min.	Standard	Max.
104	<span style="border: 1px solid black; padding: 0 2px;">130</span>	156

J:3D023759



# USP15H

## 50Hz

Entering condenser water temp. °C	Condenser water flow rate. ℓ/min	Suction air temp. °W, B.									
		16, 0		18, 0		19, 5		22, 0		24, 0	
		Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW
14, 0	166	43, 2	9, 72	46, 8	9, 88	49, 8	10, 0	55, 6	10, 2	61, 1	10, 4
	207	43, 7	9, 53	47, 4	9, 69	50, 4	9, 85	56, 2	10, 0	61, 9	10, 2
	248	44, 0	9, 44	47, 7	9, 60	50, 7	9, 75	56, 6	9, 91	62, 3	10, 1
20, 0	166	41, 7	9, 61	45, 1	10, 4	48, 0	10, 4	53, 6	10, 7	59, 0	10, 8
	207	42, 2	10, 0	45, 7	10, 2	48, 6	10, 2	54, 2	10, 5	59, 7	10, 6
	248	42, 4	9, 40	46, 0	10, 1	48, 9	10, 1	54, 6	10, 4	60, 0	10, 5
24, 0	166	40, 8	10, 4	44, 1	10, 7	46, 9	10, 8	52, 4	11, 2	57, 7	11, 5
	207	41, 2	10, 2	44, 7	10, 5	47, 5	10, 6	53, 0	11, 0	58, 4	11, 3
	248	41, 5	10, 1	44, 9	10, 4	47, 8	10, 5	53, 3	10, 9	58, 7	11, 2
28, 0	166	39, 7	10, 4	43, 0	10, 6	45, 7	11, 3	51, 0	11, 2	56, 1	11, 5
	207	40, 2	10, 2	43, 5	10, 4	46, 3	11, 1	51, 6	11, 0	56, 8	11, 3
	248	40, 4	10, 1	43, 7	10, 3	46, 5	11, 0	51, 9	10, 9	57, 1	11, 2
32, 0	166	38, 7	11, 2	41, 8	11, 5	44, 5	11, 8	49, 7	12, 3	54, 6	12, 8
	207	39, 1	11, 0	42, 3	11, 3	45, 0	11, 6	50, 2	12, 1	55, 3	12, 6
	248	39, 3	10, 9	42, 6	11, 2	45, 3	11, 5	50, 5	12, 0	55, 6	12, 4
38, 0	166	36, 9	12, 0	40, 0	12, 3	42, 7	12, 6	47, 6	13, 3	52, 5	13, 6
	207	37, 5	11, 8	40, 5	12, 1	43, 2	12, 4	48, 2	13, 0	53, 0	13, 3
	248	37, 7	11, 6	40, 8	12, 0	43, 5	12, 3	48, 5	12, 9	53, 4	13, 2

Change of condenser head loss to changes in water flow rate.

Water flow rate ℓ/min	166	207	248
Head loss×10 <sup>3</sup> Pa	7, 85	12, 3	16, 7

Correction factors for capacity and power input, and bypass factor to change in air flow rate.

Air flow rate m <sup>3</sup> /min		80	90	100	110	120	130	140
Correction factor	Capacity	0. 92	0. 96	1. 00	1. 03	1. 06	1. 08	1. 10
	Power input	0. 98	0. 99	1. 00	1. 01	1. 02	1. 02	1. 03
Bypass factor		0. 14	0. 16	0. 18	0. 20	0. 21	0. 23	0. 24

Limit of condenser water flow rate.  
(ℓ/min)

Min.	Standard	Max.
166	207	248

### Note:

- Figures in  are nominal capacities.
- These capacities are net capacities which include a deduction for cooling for fan motor heat.
- The power input in the table is the total of comp. input and fan motor input.
- Some specifications are subject to change after further development.

J:3D023760

## 60Hz

Entering condenser water temp. °C	Condenser water flow rate. ℓ/min	Suction air temp. °W, B.									
		16, 0		18, 0		19, 5		22, 0		24, 0	
		Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW
14, 0	180	48, 0	13, 0	52, 0	13, 2	55, 3	13, 4	61, 7	13, 6	67, 9	13, 8
	225	48, 6	12, 7	52, 6	13, 0	56, 0	13, 2	62, 5	13, 4	68, 8	13, 6
	270	48, 9	12, 6	53, 0	12, 8	56, 3	13, 0	62, 9	13, 2	69, 2	13, 5
20, 0	180	46, 3	12, 8	50, 2	13, 8	53, 4	13, 8	59, 5	14, 3	65, 5	14, 5
	225	46, 9	13, 4	50, 8	13, 6	54, 0	13, 6	60, 3	14, 0	66, 3	14, 2
	270	47, 2	12, 6	51, 1	13, 5	54, 3	13, 5	60, 6	13, 9	66, 7	14, 1
24, 0	180	45, 3	13, 8	49, 0	14, 3	52, 2	14, 5	58, 2	14, 9	64, 1	15, 4
	225	45, 8	13, 6	49, 6	14, 0	52, 8	14, 2	58, 9	14, 7	64, 8	15, 1
	270	46, 1	13, 5	49, 9	13, 9	53, 1	14, 1	59, 3	14, 5	65, 2	14, 9
28, 0	180	44, 1	13, 9	47, 7	14, 1	50, 8	15, 1	56, 7	14, 9	62, 4	15, 4
	225	44, 7	13, 6	48, 3	13, 8	51, 4	14, 9	57, 4	14, 7	63, 1	15, 1
	270	44, 9	13, 5	48, 6	13, 7	51, 7	14, 7	57, 7	14, 5	63, 5	14, 9
32, 0	180	43, 0	14, 9	46, 4	15, 4	49, 4	15, 8	55, 2	16, 4	60, 7	17, 1
	225	43, 4	14, 7	47, 0	15, 1	50, 0	15, 5	55, 8	16, 1	61, 4	16, 8
	270	43, 7	14, 5	47, 3	14, 9	50, 3	15, 3	56, 1	16, 0	61, 8	16, 6
38, 0	180	41, 0	16, 0	44, 5	16, 4	47, 4	16, 9	52, 9	17, 7	58, 4	18, 2
	225	41, 7	15, 7	45, 0	16, 1	48, 0	16, 6	53, 6	17, 4	58, 9	17, 8
	270	41, 9	15, 6	45, 3	16, 0	48, 3	16, 4	53, 9	17, 2	59, 3	17, 7

Change of condenser head loss to changes in water flow rate.

Water flow rate ℓ/min	180	225	270
Head loss×10 <sup>3</sup> Pa	9, 81	14, 2	17, 7

Correction factors for capacity and power input, and bypass factor to change in air flow rate.

Air flow rate m³/min		80	90	100	110	120	130	140
Correction factor	Capacity	0.87	0.91	0.97	1.00	1.00	1.02	1.04
	Power input	0.95	0.97	0.99	1.00	1.00	1.01	1.02
Bypass factor		0.14	0.16	0.18	0.20	0.21	0.23	0.24

Limit of condenser water flow rate.  
(ℓ/min)

Min.	Standard	Max.
180	225	270

### Note:

- Figures in  are nominal capacities.
- These capacities are net capacities which include a deduction for cooling for fan motor heat.
- The power input in the table is the total of comp. input and fan motor input.
- Some specifications are subject to change after further development.

J:3D023761

# USP20H

## 50Hz

Entering condenser water temp. °C	Condenser water flow rate. ℓ/min	Suction air temp. °W. B.									
		16.0		18.0		19.5		22.0		24.0	
		Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW
14.0	220	58.5	12.5	63.2	12.8	67.2	13.2	74.8	13.7	82.0	14.0
	275	59.0	12.0	63.7	12.3	67.8	12.6	75.5	13.1	82.7	13.4
	330	59.1	11.8	63.9	12.1	68.0	12.4	75.7	12.9	82.9	13.2
20.0	220	56.3	14.1	60.8	14.4	64.7	14.8	72.0	15.3	78.9	15.7
	275	56.9	13.8	61.5	14.2	65.4	14.6	72.8	15.1	79.8	15.5
	330	57.2	13.4	61.8	13.8	65.8	14.1	73.2	14.7	80.2	15.0
24.0	220	54.8	15.1	59.2	15.5	63.0	15.9	70.1	16.5	76.9	16.9
	275	55.3	14.7	59.8	15.1	63.6	15.4	70.8	16.0	77.6	16.4
	330	55.9	14.3	60.3	14.6	64.2	15.0	71.5	15.6	78.3	15.9
28.0	220	53.2	15.9	57.5	16.3	61.2	16.7	68.1	17.4	74.7	17.8
	275	53.6	15.7	57.9	16.2	61.6	16.6	68.6	17.2	75.2	17.6
	330	54.3	15.5	58.7	15.9	62.4	16.3	69.5	16.9	76.1	17.3
32.0	220	51.5	16.9	55.6	17.4	59.2	17.8	65.9	18.5	72.2	18.9
	275	52.2	16.5	56.4	17.0	60.0	17.4	66.8	18.1	73.2	18.5
	330	52.5	16.3	56.8	16.7	60.4	17.2	67.2	17.8	73.7	18.2
38.0	220	49.0	18.2	52.9	18.7	56.3	19.1	62.7	19.9	68.7	20.3
	275	49.6	17.8	53.6	18.2	57.0	18.7	63.5	19.4	69.5	19.9
	330	50.1	17.6	54.1	18.0	57.5	18.5	64.1	19.2	70.2	19.6

### Note:

- Figures in  are nominal capacities.
- These capacities are net capacities which include a deduction for cooling for fan motor heat.
- The power input in the table is the total of comp. input and fan motor input.
- Some specifications are subject to change after further development.

Change of condenser head loss to changes in water flow rate.

Water flow rate ℓ/min	220	275	330
Head loss×10 <sup>3</sup> Pa	8.17	12.3	16.8

Correction factors for capacity and power input, and bypass factor to change in air flow rate.

Air flow rate m <sup>3</sup> /min		115	135	150	160	170	190
Correction factor	Capacity	0.97	1.00	1.03	1.05	1.06	1.09
	Power input	0.99	1.00	1.01	1.02	1.02	1.04
Bypass factor		0.13	0.14	0.17	0.18	0.19	0.21

Limit of condenser water flow rate.  
(ℓ/min)

Min.	Standard	Max.
220	275	330

J:3D023762

## 60Hz

Entering condenser water temp. °C	Condenser water flow rate. ℓ/min	Suction air temp. °W. B.									
		16.0		18.0		19.5		22.0		24.0	
		Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW	Capacity kW	Power input kW
14.0	240	64.2	17.8	69.2	18.1	73.4	18.7	81.3	19.6	88.7	20.1
	300	64.5	17.4	69.6	17.7	73.8	18.2	81.7	19.1	89.2	19.6
	360	64.9	17.2	70.0	17.5	74.2	18.0	82.2	18.9	89.7	19.4
20.0	240	62.4	19.0	67.4	19.4	71.4	20.0	79.1	20.9	86.3	21.5
	300	62.8	18.8	67.7	19.2	71.8	19.8	79.5	20.7	86.8	21.3
	360	63.1	18.6	68.1	19.0	72.2	19.5	80.0	20.5	87.3	21.0
24.0	240	61.0	20.1	65.8	20.5	69.8	21.1	77.3	22.1	84.4	22.7
	300	61.6	19.9	66.4	20.2	70.4	20.8	78.0	21.8	85.1	22.4
	360	61.7	19.6	66.6	20.0	70.6	20.6	78.2	21.6	85.4	22.2
28.0	240	59.6	20.9	64.3	21.3	68.2	21.9	75.5	23.0	82.5	23.6
	300	60.2	20.7	64.9	21.1	68.8	21.7	76.2	22.7	83.2	23.4
	360	60.3	20.3	65.1	20.8	69.0	21.4	76.4	22.4	83.4	23.0
32.0	240	58.1	22.1	62.6	22.6	66.4	23.2	73.5	24.3	80.3	25.0
	300	58.6	21.7	63.2	22.1	67.0	22.8	74.2	23.9	81.0	24.5
	360	58.9	21.5	63.6	21.9	67.4	22.6	74.6	23.6	81.5	24.3
38.0	240	55.4	23.4	59.8	23.8	63.4	24.5	70.2	25.7	76.6	26.4
	300	56.1	23.2	60.6	23.6	64.2	24.3	71.1	25.5	77.6	26.2
	360	56.5	23.0	60.9	23.4	64.6	24.1	71.5	25.3	78.1	25.9

### Note:

- Figures in  are nominal capacities.
- These capacities are net capacities which include a deduction for cooling for fan motor heat.
- The power input in the table is the total of comp. input and fan motor input.
- Some specifications are subject to change after further development.

Change of condenser head loss to changes in water flow rate.

Water flow rate ℓ/min	240	300	360
Head loss×10 <sup>3</sup> Pa	9.84	14.2	19.3

Correction factors for capacity and power input, and bypass factor to change in air flow rate.

Air flow rate m <sup>3</sup> /min		115	130	150	160	170	190
Correction factor	Capacity	0.92	0.94	0.98	1.00	1.02	1.05
	Power input	0.97	0.98	0.99	1.00	1.01	1.02
Bypass factor		0.13	0.14	0.17	0.18	0.19	0.21

Limit of condenser water flow rate.  
(ℓ/min)

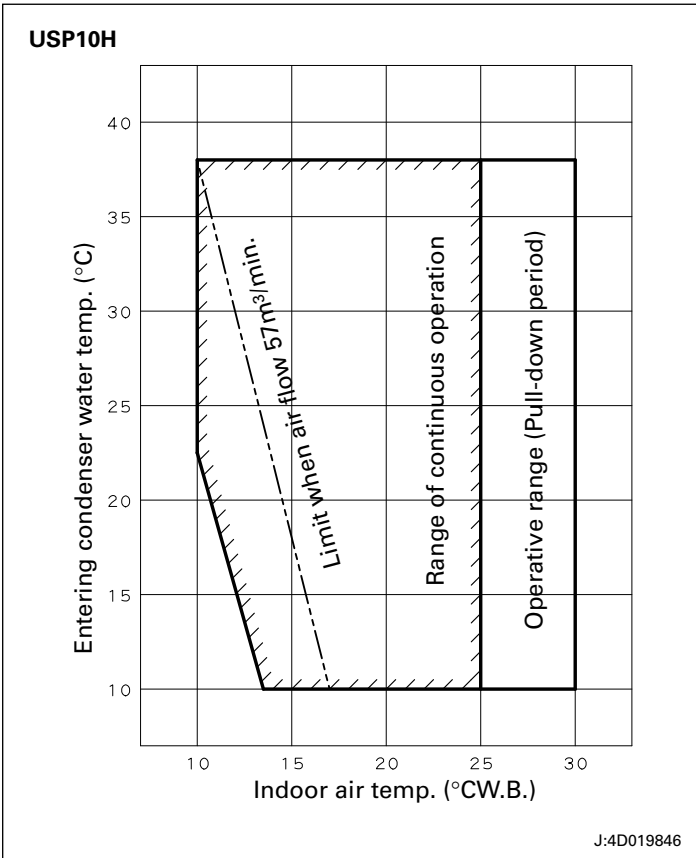
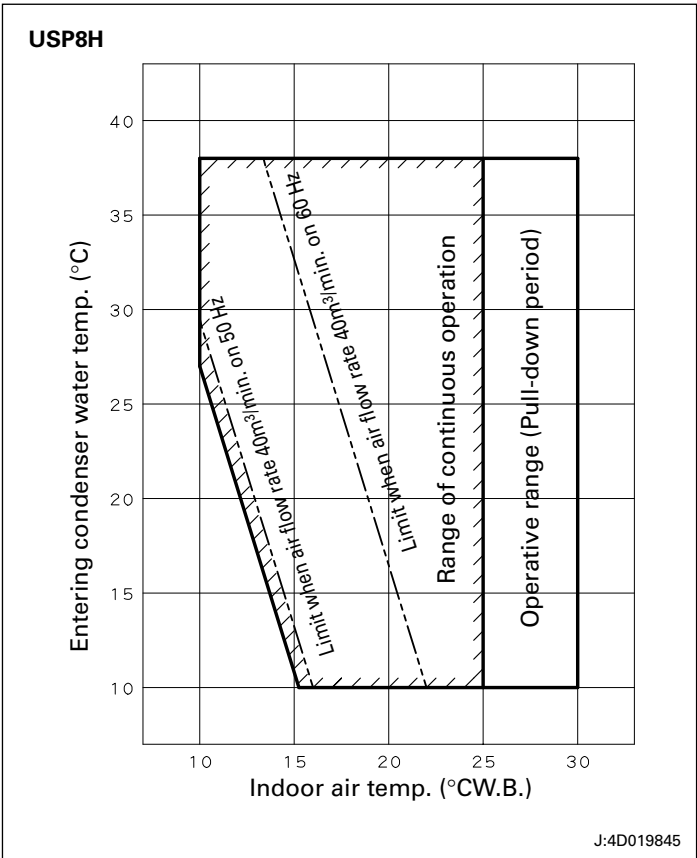
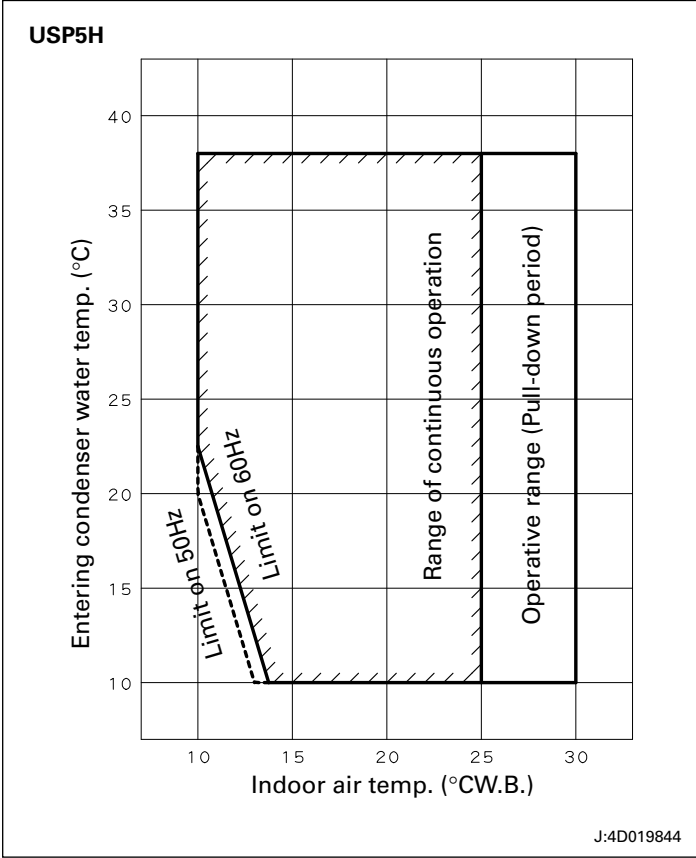
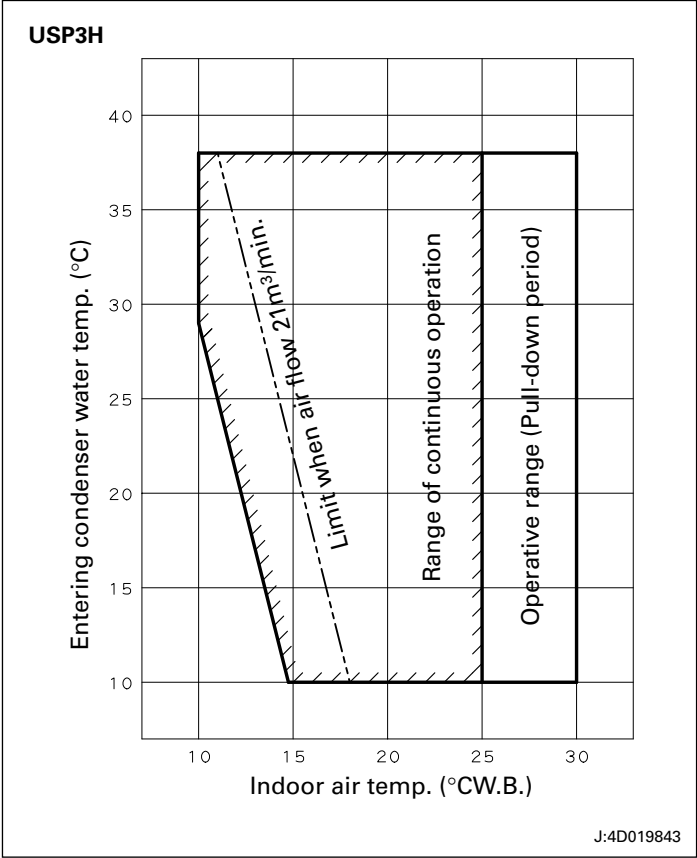
Min.	Standard	Max.
240	300	360

J:3D023763

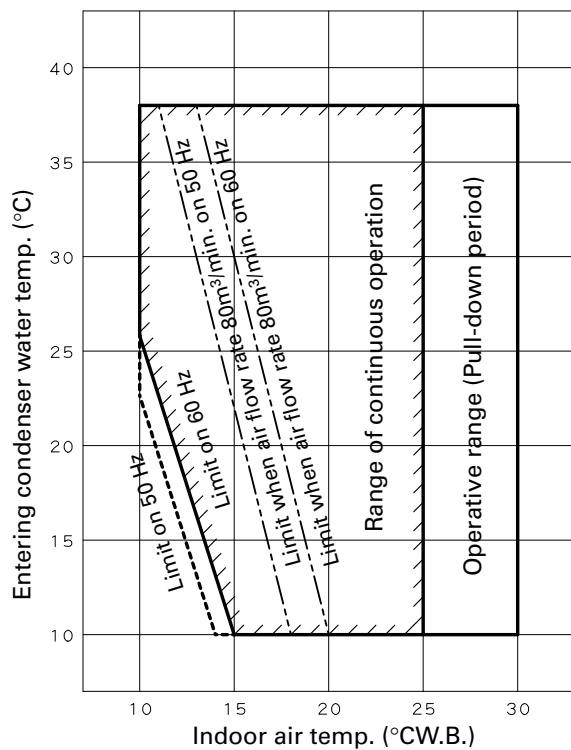
# 8. Operation Limit

## 8.1 Operation Limit

- Notes:**
- (1)The operation limits shown with bold line in the following diagrams are based on the standard condenser water flow rate and air flow rate on 50/60 Hz shown in the 2.Specifications.
  - (2)When operating at near the low temperature limit, set the water regulating valve.

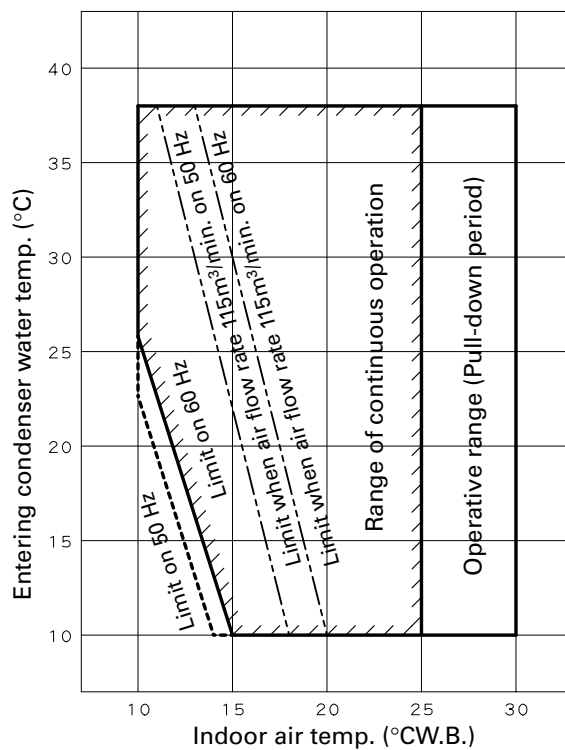


# USP15H



J:4D019847

# USP20H

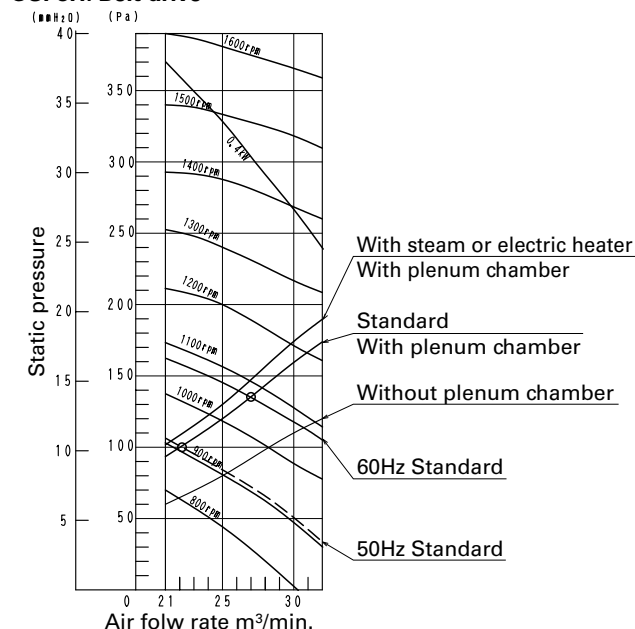


J:4D019848

## 9. Fan Performance

### 9.1 Fan Performance

**USP3H: Belt drive**



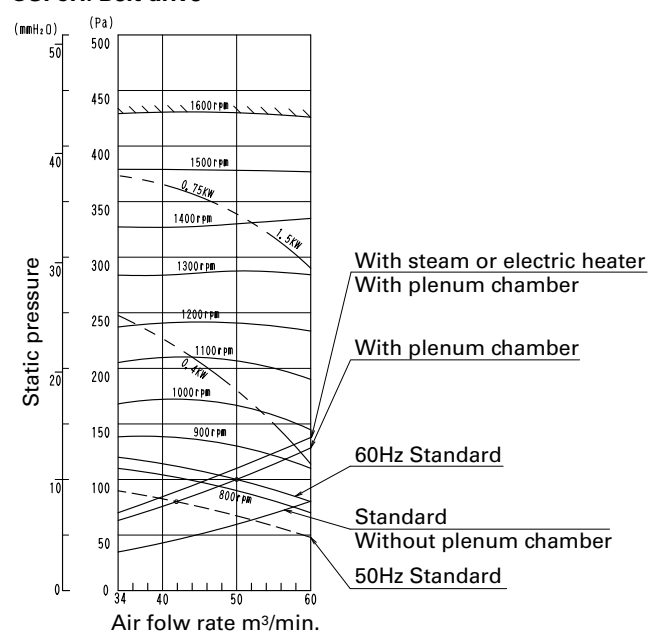
Standard motor output 0.4kW  
 Standard fan pulley 1A121  
 Standard motor pulley 1A84  
 Operative air flow 22~32m³/min.  
 V belt A23

**Notes:**

1. ○ shows standard operating point.
2. Steam heater and electric heater are optional accessories.

J:4D019932

**USP5H: Belt drive**



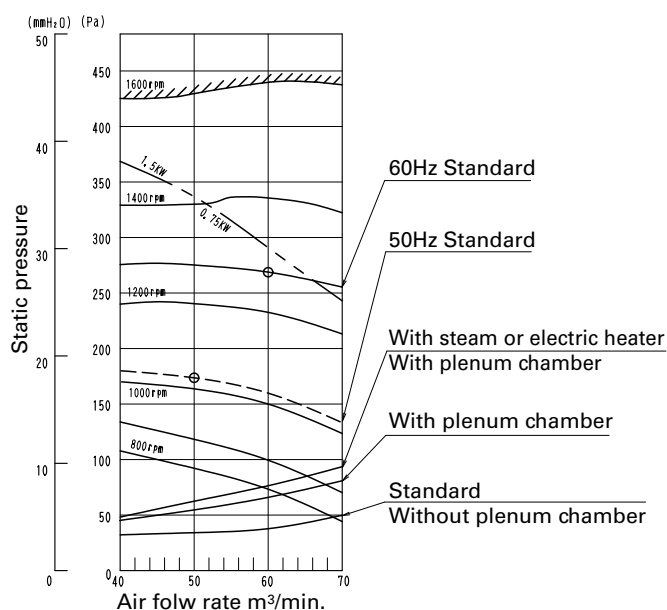
Standard motor output 0.4kW  
 Standard fan pulley 1A233  
 Standard motor pulley 1A115  
 Operative air flow 34~60m³/min.  
 V belt A43

**Notes:**

1. ○ shows standard operating point.
2. Do not select a fan within a range fringed with oblique lines.

J:4D019933

**USP8H: Belt drive**



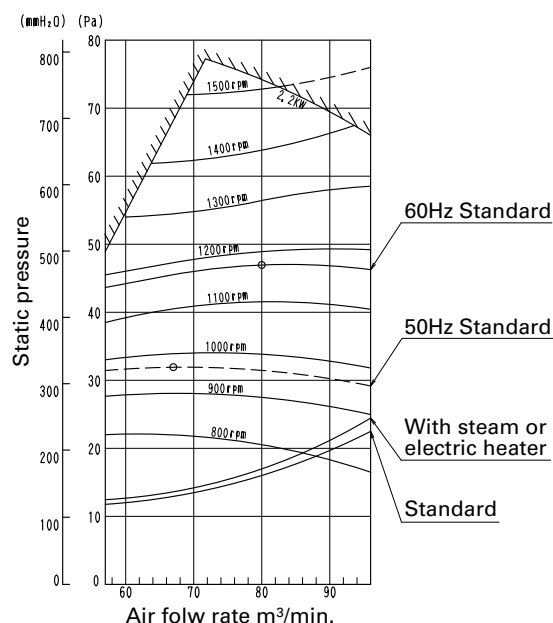
Standard motor output 0.75kW  
 Standard fan pulley 1A195  
 Standard motor pulley 1A149  
 Operative air flow 40~70m³/min.  
 V belt A44

**Notes:**

1. ○ shows standard operating point.
2. Do not select a fan within a circle fringed with oblique lines.

J:4D019934

**USP10H: Belt drive**



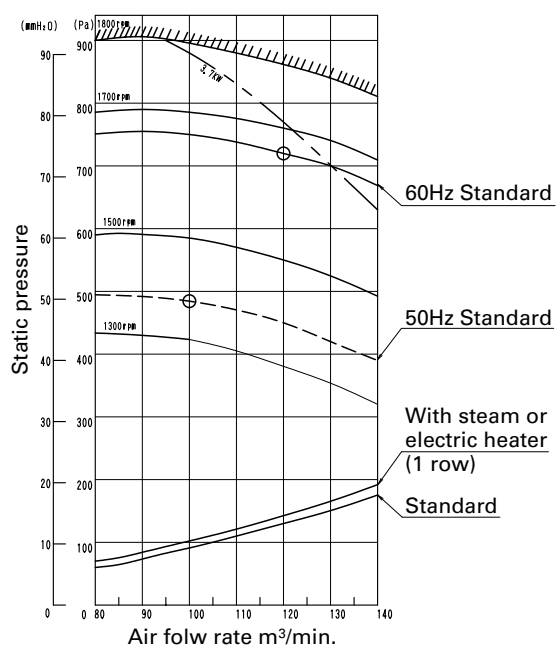
Standard motor output 2.2kW  
 Standard fan pulley 2B235  
 Standard motor pulley 2B161  
 Operative air flow 57~96m³/min.  
 V belt B44

**Notes:**

1. ○ shows standard operating point.
2. Do not select a fan within a circle fringed with oblique lines.

J:4D019935

### USP15H: Belt drive



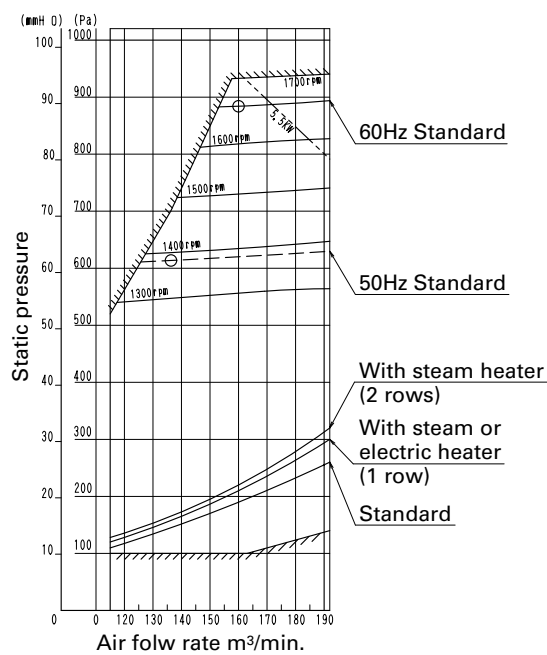
Standard motor output 3.7kW  
 Standard fan pulley 2B247  
 Standard motor pulley 2B235  
 Operative air flow 80~130m<sup>3</sup>/min.  
 V belt B71

#### Notes:

1. ○ shows standard operating point.
2. Do not select a fan within a circle fringed with oblique lines.

J:4D019936

### USP20H: Belt drive



Standard motor output 5.5kW  
 Standard fan pulley 2B247  
 Standard motor pulley 2B235  
 Operative air flow 115~192m<sup>3</sup>/min.  
 V belt B75

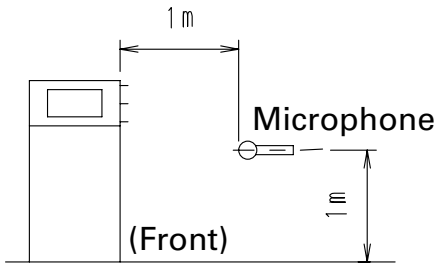
#### Notes:

1. ○ shows standard operating point.
2. Do not select a fan within a circle fringed with oblique lines.

J:4D019937

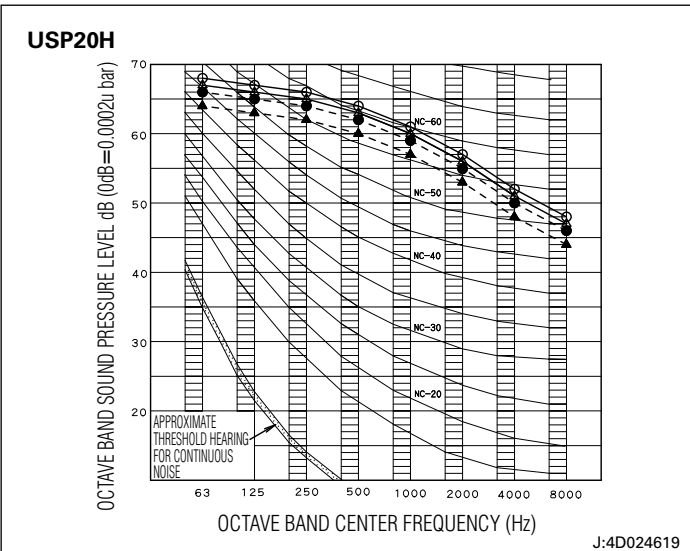
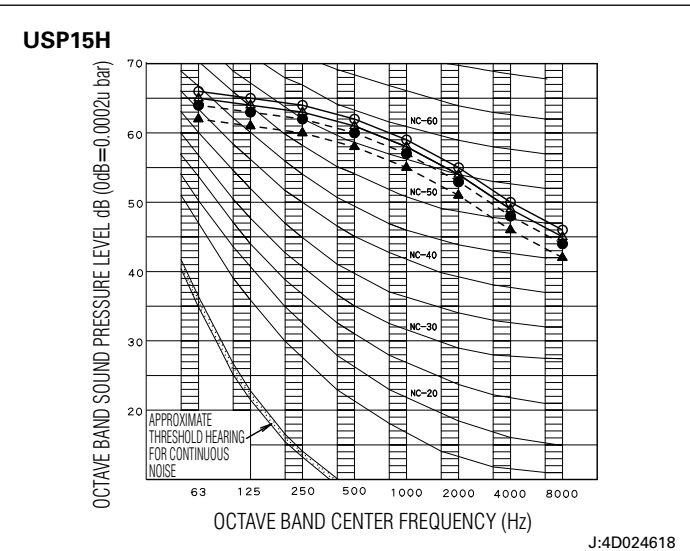
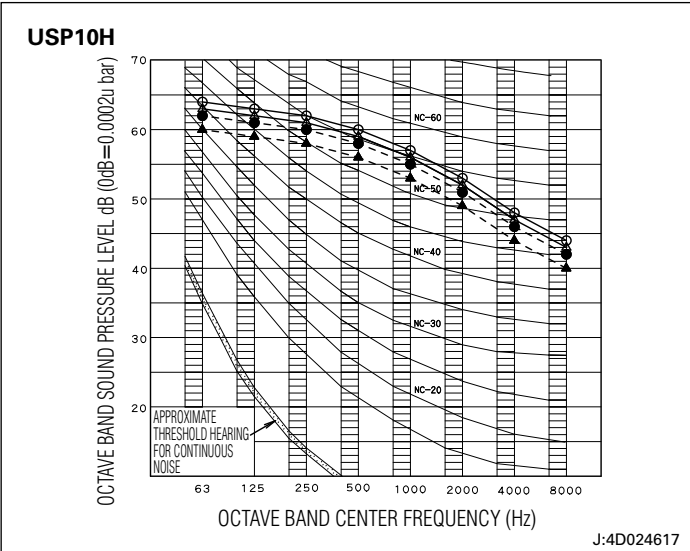
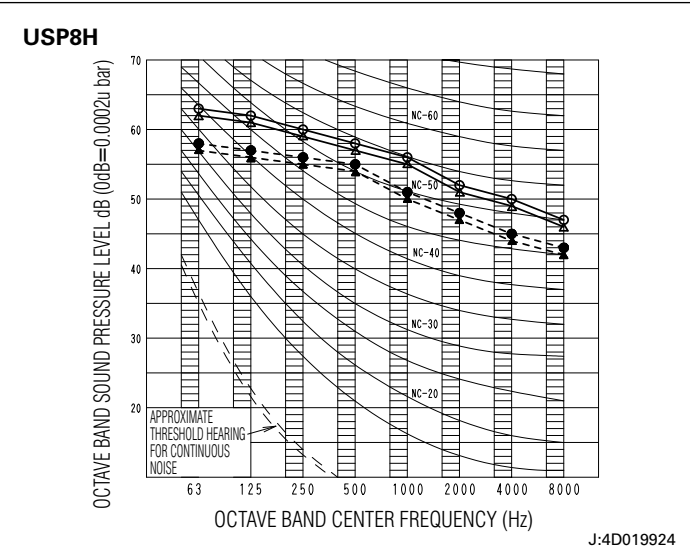
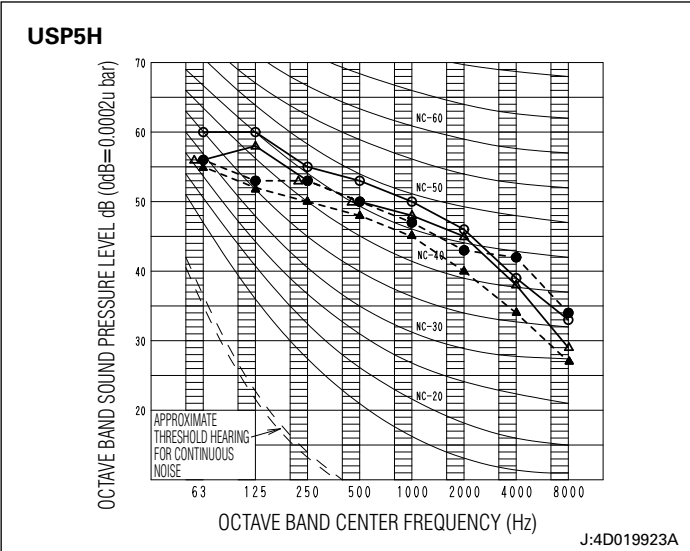
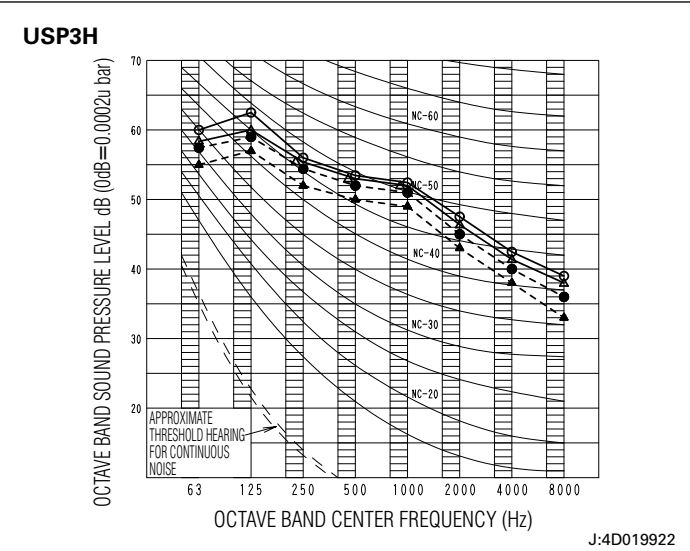
## 10. Sound Level

### 10.1 Overall Sound Level

Model	A scale (dB)				Measuring location
	50 Hz, 380V		60 Hz, 440V		
	Fan Operation	Cooling	Fan Operation	Cooling	
USP3H	54	56	56	57	
USP5H	50	52	53	55	
USP8H	54	56	59	60	
USP10H	58	60	61	62	
USP15H	60	62	63	64	
USP20H	62	64	65	66	

**Note:** Operation noise is measured in an anechoic chamber.

10.2 Octave Band Level



- Notes:
- --- ● 50Hz Cooling
  - --- ○ 60Hz Cooling
  - ▲ --- ▲ 50Hz Fan operation
  - △ --- △ 60Hz Fan operation



# 11. Electric Characteristics

## 11.1 Electric Characteristics

Model	Rated power supply (volts-pH-Hz)	Starting method	Compressor			Fan motor		Total	
			No.	LRA each	MRC each	No.	MRC	MRC	NRC
USP3H	380-3-50	Direct	1	38	7.5	1	1.1	8.6	4.63
	400-3-50			40					4.83
	400-3-60			34					4.93
	440-3-60			37					5.37
USP5H	380-3-50	Direct	1	49	10	1	1.2	11.2	7.35
	400-3-50			51					7.65
	400-3-60			47					7.95
	440-3-60			45					7.62
USP8H	380-3-50	Direct	1	99	14	1	1.5	15.5	11.1
	400-3-50			105					11.7
	400-3-60			93					12.5
	440-3-60			95					12.8
USP10H	380-3-50	Direct	1	122	22	1	4.6	26.6	15.8
	400-3-50			127					16.4
	400-3-60			112					16.7
	440-3-60			115					17.2
USP15H	380-3-50	Direct	2	99	14	1	8.0	36	20.7
	400-3-50			105					21.9
	400-3-60			93					24.0
	440-3-60			95					24.5
USP20H	380-3-50	Direct	2	122	22	1	11	55	31.6
	400-3-50			127					32.9
	400-3-60			112					33.5
	440-3-60			115					34.4

### Symbols :

LRA : Locked rotor amps(A)  
(ΔWiring)

MRC : Maximum running current(A)

NRC : Nominal running current(A)

### Notes :

1. Max.inrush current is the total of LRA for the compressor to be operated finally and MRC for the compressor and the fan motor in operation.
2. NRC means running current for unit at the same conditions as the nominal cooling capacity.

# 12. Installation

## 12.1 Location of Installation

Before installation, check the following points.

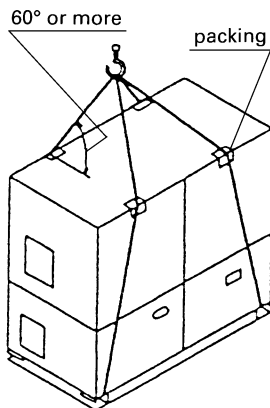
- 1) Design the air distribution of the air conditioner into a room in consideration with room structure, numbers of occupants and the layout of furniture.
- 2) Install the air conditioner in such a place, from where the air can be distributed throughout a room without any interruption by furniture and instruments.
- 3) Install the air conditioner in such a place where electricity or condenser water can be supplied easily and condensation disposal can be easily extracted outside.
- 4) Fix the air conditioner in such a place which is strong enough to bear its weight and as flat as possible.
- 5) Install the air conditioner in such a place which is wide enough to do usual maintenance and service work easily.
- 6) In case the air conditioner is enclosed, provide space for return air and leave sufficient space around the unit for maintenance and inspection.

## 12.2 Bring in the Unit as Near as Possible to the Position Installed

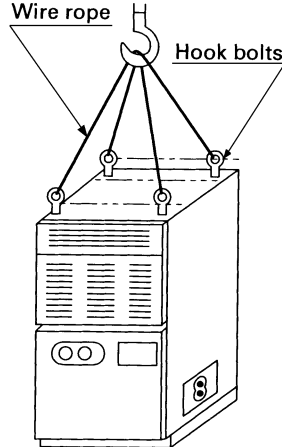
When hanging the unit, refer to the following table.

Minimum Length	Model
2m×2	USP3H·USP5H
3.5m×2	USP8H·USP10H USP15H·USP20H

### ■ USP3-5-8-10 H



### ■ USP15H/USP20H



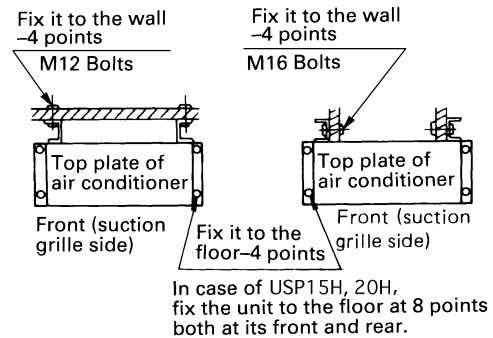
## 12.3 Service Spacing

Leave service spacing as large as possible around the air conditioner for connecting the pipes, etc. In particular, at the front of the unit, space is required for operation, as the control panel, various pressure switches, thermostat, and switch box are attached to the front of the unit. Furthermore, the space for cleaning the cooling tubes of the condenser must also be left. The minimum service spacing for models is illustrated in the respective dimension drawings.

## 12.4 Fixing the Air Conditioner

Firmly fix the air conditioner to the wall or the foundation to prevent the unit from falling down or swinging due to rolling or pitching of the ship body.

As shown in the figure, fix the unit at its base frame at 4 points and at its rear plate of the casing at 4 points with bolts and nuts.

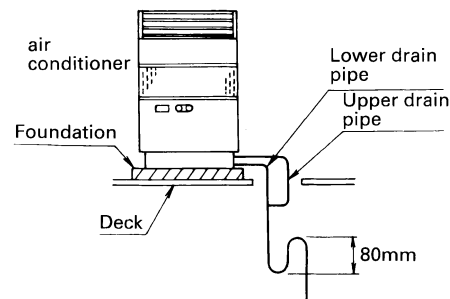


## 12.5 Providing the Drain Piping to the Air Conditioner

- 1) Connect drain pipes to upper and lower drain pipe connections of the unit separately.
- 2) In case the drain pipes should be combined, do it at the position which is lower than the lower drain pipe connection to prevent condensation disposal from entering into the lower drain pipe connection.
- 3) Do not connect both upper and lower drain pipes to the condenser water piping.
- 4) Since the drain piping is connected to the unit on the suction-air side of the fan, be sure to provide a trap at the drain outlet.

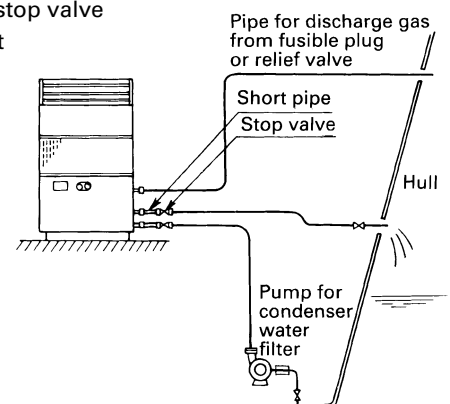
### Reference

- Volume of condensation is approx. 0.02~0.03 ℓ /min. per refrigeration ton in case of normal cooling.



## 12.6 Piping around the Air Conditioner

It is advisable to connect a short pipe between the air conditioner and the stop valve for easy replacement of the sacrificial anode plate, maintenance and inspection of cooling tubes.



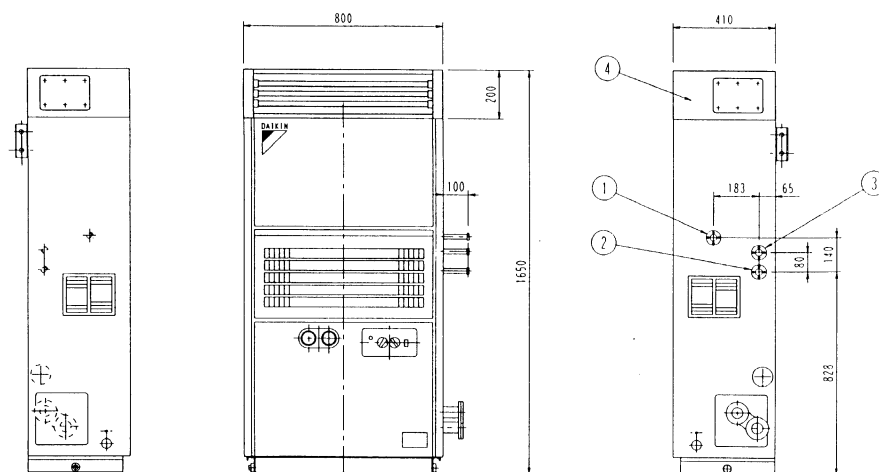
# Part 2

## Optional Accessories

1. Plenum Chamber .....	34
1.1 USP3H.....	34
1.2 USP5H/8H.....	35
2. Heaters .....	36
2.1 Electric Heaters .....	36
2.2 Steam Heater and Steam Spray Type Humidifier .....	49
3. Rear Duct Connection.....	58
3.1 USP5H.....	58
3.2 USP8H/USP10H.....	60
4. Fresh Air Intake Duct Connection.....	63
4.1 Cautions.....	63
4.2 Mounting Procedure.....	63
4.3 Parts .....	64
5. Air Discharge Duct Connection (Without Plenum Chamber) .....	65
5.1 Caution .....	65
5.2 Mounting Procedure.....	65
5.3 Parts .....	66
6. Fan Motor One Size Larger .....	67
6.1 Applicable Model.....	67
6.2 Mounting Procedure.....	67

# 1. Plenum Chamber

## 1.1 USP3H



- ① Steam heater inlet (1/2B SGP[15A(25A)] JIS 5kg/cm<sup>2</sup> flange)
- ② Steam heater outlet (1/2B SGP[15A(25A)] JIS 5kg/cm<sup>2</sup> flange)
- ③ Steam spray inlet (1/2B SGP[15A(25A)] JIS 5kg/cm<sup>2</sup> flange)
- ④ Plenum chamber

### Notes

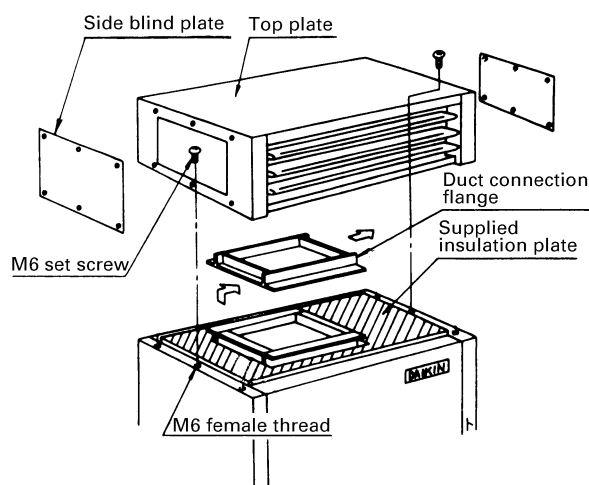
①②, or ③ can be mounted from left side of the body.

### 1. Mounting Plenum Chamber

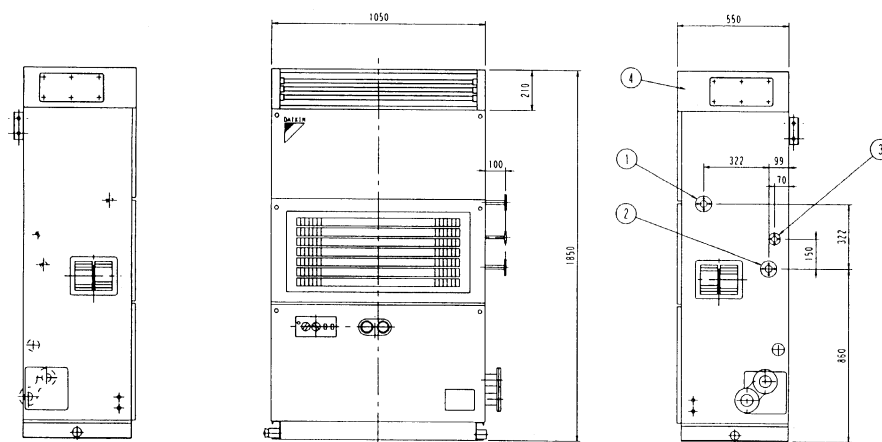
Remove the duct connection flange from the airconditioner body and apply the supplied insulation plate on the top plate of the airconditioner body, and then after removing the plenum chamber top plate or the blind plates at both sides, set the plenum chamber with setscrews.

Place the top plate and blind plates back in position.

Part Name	Applicable Model
KPC-US3GCA	USP3H



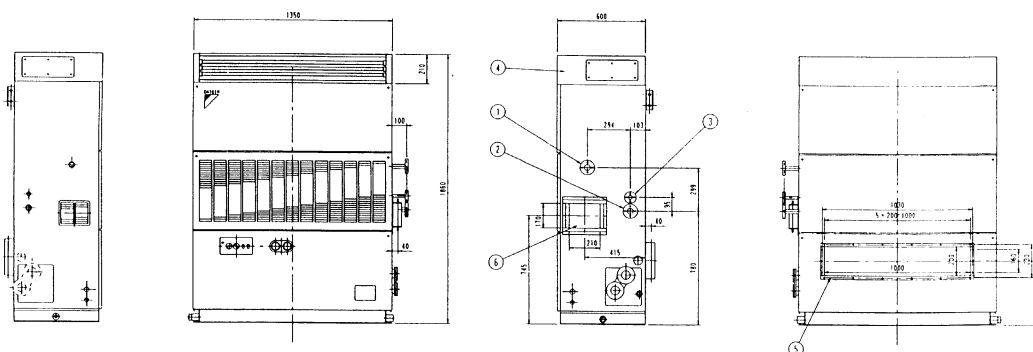
## 1.2 USP5H USP8H



- ① Steam heater inlet (3/4B SGP[20A] JIS 5kg/cm<sup>2</sup> flange)
- ② Steam heater outlet (3/4B SGP[20A] JIS 5kg/cm<sup>2</sup> flange)
- ③ Steam spray inlet (1/2B SGP[15A] JIS 5kg/cm<sup>2</sup> flange)
- ④ Plenum chamber

### Notes

①②, or ③ can be mounted from left side of the body.



- ① Steam heater inlet (1B SGP[25A] JIS 5kg/cm<sup>2</sup> flange)
- ② Steam heater outlet (1B SGP[25A] JIS 5kg/cm<sup>2</sup> flange)
- ③ Steam spray inlet (3/4B SGP[20A] JIS 5kg/cm<sup>2</sup> flange)
- ④ Rear duct connection
- ⑤ Fresh air intake duct connection

### Notes

①②③ or ⑤ can be mounted from left side of the body.

## 1. Required Parts

Model	Part Name	Q'ty
USP8H	KPC-US8FC	1
USP5H	KPC-US5F	1

## 2. Mounting Work Procedure

1. Remove the duct connection flange from the airconditioner body.
2. Remove the top plate or the blind plates at both sides, and fix the plenum chamber securely to the airconditioner body.
3. Place the top plate and blind plates back in position.

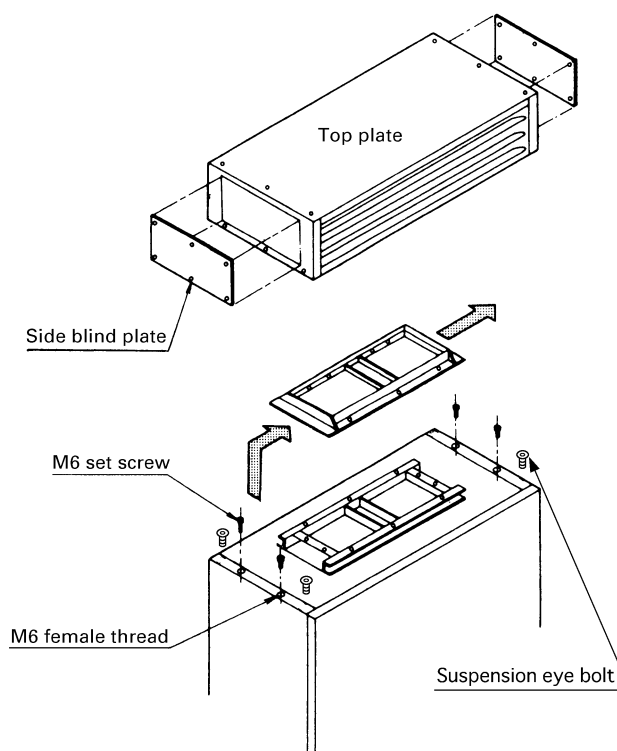
## 3. Cautions on Mounting

When mounting the plenum chamber, in order to maintain the air flow in the rated volume, replace the motor pulley and V-belt for standard air conditioner with those included in the plenum chamber kit.

### ● Pulley and V-belt for replacement

(For only USP8H)

Model	USP8H
Motor pulley	A104-19
V-belt	A-41



## 2. Heaters

### 2.1 Electric Heaters

#### 2.1.1 Specifications

Model		USP3H	USP5H	USP8H	USP10H	USP15H	USP20H
Heater capacity	kW	9	7.5+7.5	12+12	15+15	24+24	30+30
Number of steps	Step	1	2				1
Heater element	Q'ty	9	12			18	24
Overheat protection thermostat		CS-12 NFZ187 80 / 52 OFF : 80±3°C					
Thermal fuse		110°C, 6A					
Magnetic contactor		HE-26-T001	HE-26-T001×2	HE-35F-TR01D×2	CLK-50J-P6×2	CLK-65H-P4×2	
Cooling / heating selector switch		BLN64 (Standard accessory)				A3TD21-1	
Step selector switch		—	BTN11-1				—
Terminal board for power supply (additional)		—	3P, 600V, 25A	3P, 600V, 35A	3P, 600V, 60A	3P, 600V, 80A	3P, 600V, 100A

**Note:**

Electric heater and steam spray type humidifier can not be installed together.

## 2.1.2 Mounting Procedure

### USP3H

### USP8H

### USP10H

1. Remove the suction grille, front plates (upper & lower) and rear plate, and temporarily keep them in a safe place.
2. Attach the fan motor cover. (For USP8H only)
3. Align the center of the electric heater with that of the casing, and drill holes on site.
4. Fix both the upper and lower parts of the electric heater securely to the evaporator.
5. Mount the overheat protection thermostat and the thermal fuse on the mounting plate and fix the plate to the electric heater.
6. Take out the lead wires from the overheat protection thermostat and thermal fuse and clamp them on the heater body.
7. Drill a hole in the rubber bush which is mounted on the side blind plate of the evaporator, and pass therethrough the heater wires and the lead wires of safety device. (In the case of Models USP3H, however, pass the lead wire of safety device along the nook of the side plate over to switch box.)
8. Remove the cover of the switch box, and attach the magnetic switch for electric heater and the terminal board for power supply in the box.
9. Mount the selector (toggle) switch for electric heater on the control panel.
  - USP3H ..... Cooling / Heating selector switch
  - USP8H, USP10H ..... Heater step No. selector switch
10. Carry out wiring work.

Proceed to the wiring work according to the electric wiring diagram, needless to say, paying due attention not to confuse wires, and securely tighten setscrews which are fixing the wires. Clamp the wires properly so as not to let them come in contact with the electric heater.
11. Mounting work is completed with fitting the cover of the switch box and the protection plate.

### USP15H

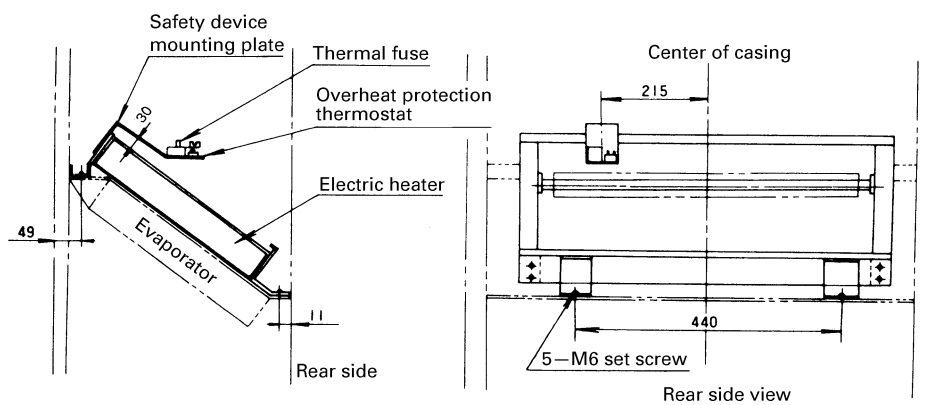
### USP20H

1. Remove both the left and right side plate (upper) and temporarily keep them in a safe place.
2. Mount the upper and lower part fixing plates of the electric heater respectively to the upper and lower frames of the evaporator.
3. Mount the overheat protection thermostat, thermal fuse and lead wires on the safety device mounting plate.
4. Fix the safety device mounting plate to the electric heater body.
5. Clamp the electric heater to the evaporator through the upper and lower fix plates.
6. Connect the lead wires to the electric heater, and pass them together with the lead wires for safety device through the wire hole of the drain pan.
7. Remove the cover of the switch box, and attach the magnetic switches for electric heater and the terminal board for power supply in the box.
8. Mount the step selector switch for electric heater to the control panel. (For USP15H only)
9. Carry out wiring work.

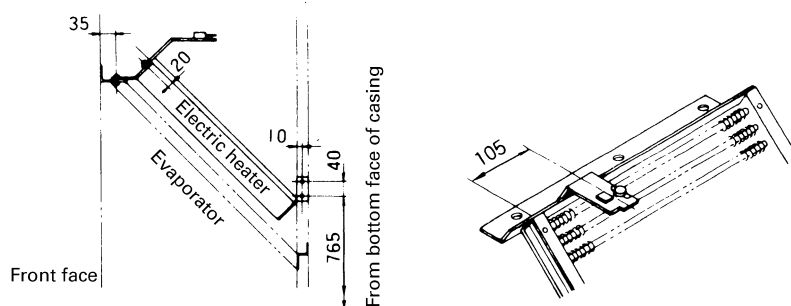
Proceed to the wiring work according to the electric wiring diagram, needless to say, paying due attention not to confuse wires, and securely tighten setscrews which are fixing the wires. Clamp the wires properly so as not to let them come in contact with the electric heater.
10. Mounting work is completed with fitting the lid of the switch box and the protection plate.

## ■ Electric Heater Mounting Position

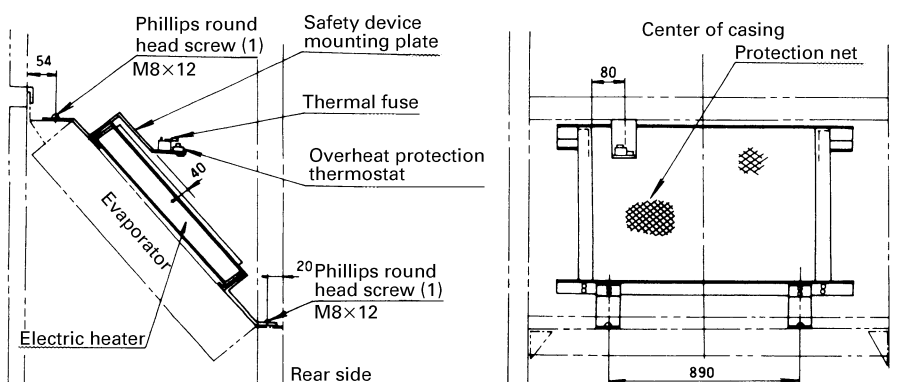
### USP3H



### USP5H

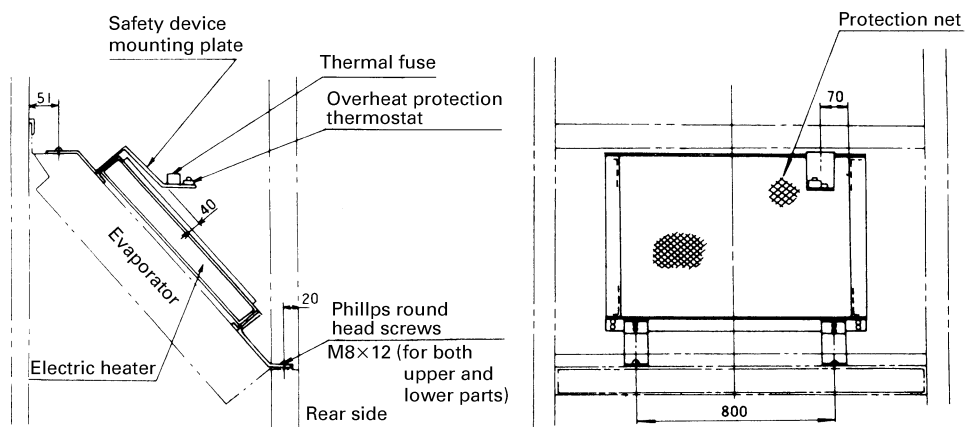


### USP8H

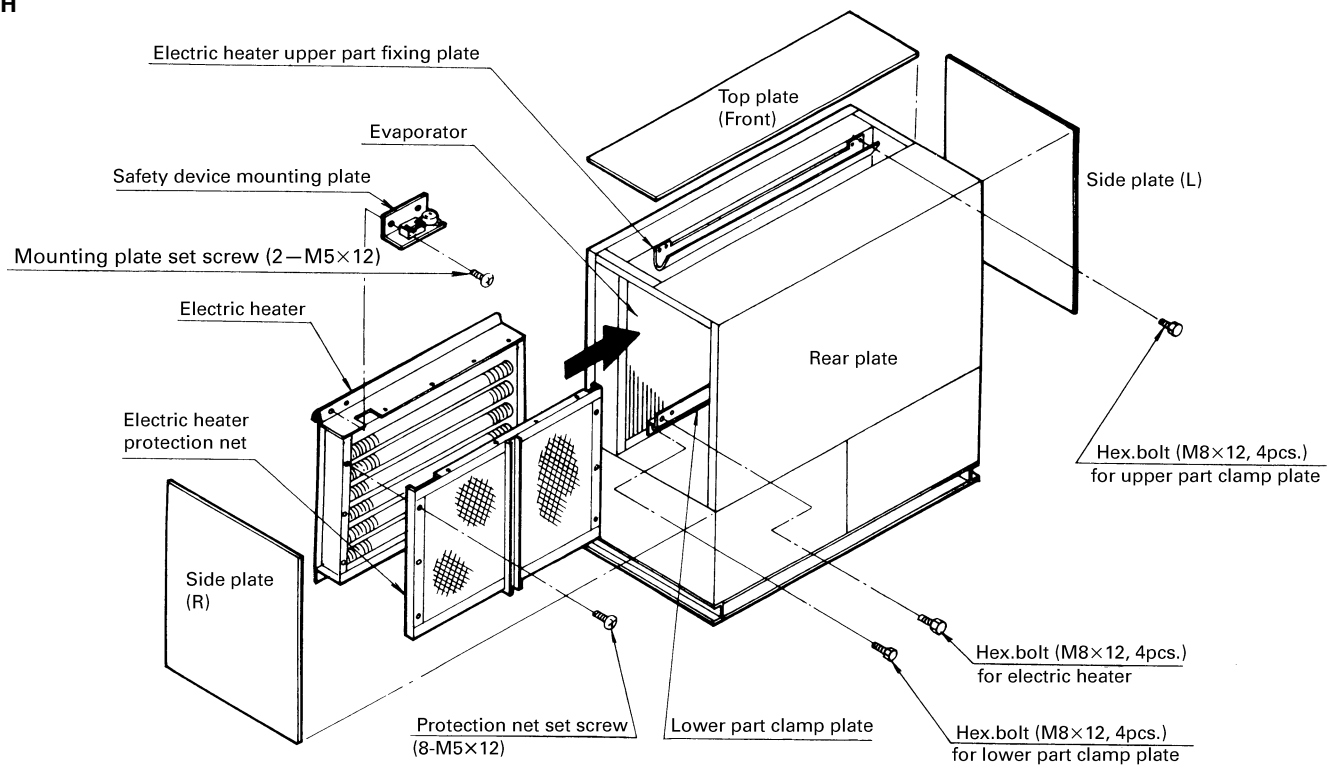




## USP10H

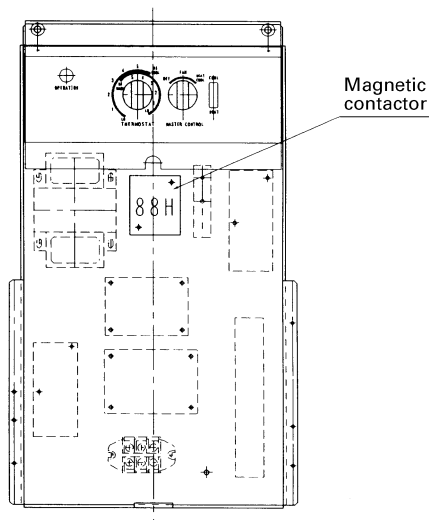


## USP15H USP20H

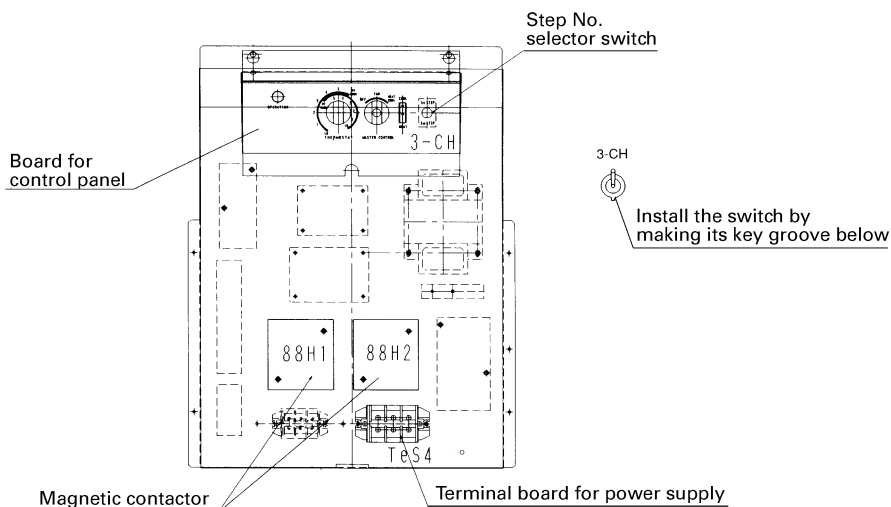


## ■ Mounting Procedure inside the Switch Box

### USP3H



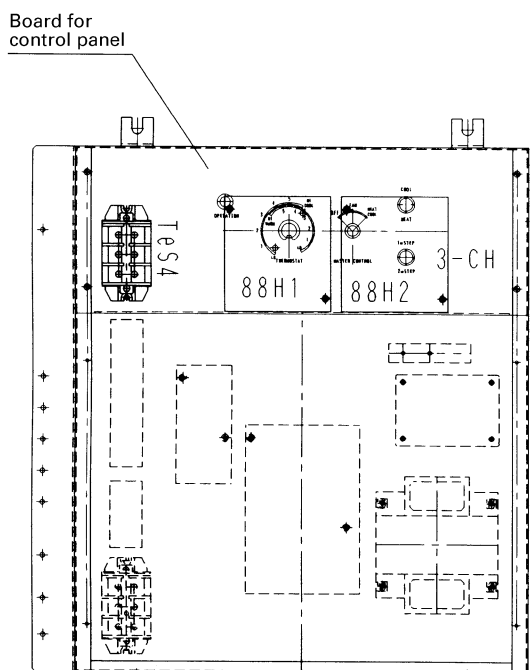
### USP5H, 8H, 10H



Item	Model	USP3H	USP5H	USP8H	USP10H
Electric heater ~ Magnetic contactor		600V-KGB 2.0mm <sup>2</sup>	600V-KGB 2.0mm <sup>2</sup>	600V-KGB 2.0mm <sup>2</sup>	600V-KGB 2.0mm <sup>2</sup>
Magnetic contactor ~ Terminal board		600V-HIV 2.0mm <sup>2</sup>	600V-HIV 2.0mm <sup>2</sup>	600V-HIV 2.0mm <sup>2</sup>	600V-HIV 2.0mm <sup>2</sup>
Terminal board ~ Thermal fuse / Overheat protection thermostat		600V-KGB 1.25mm <sup>2</sup>	600V-KGB 1.25mm <sup>2</sup>	600V-KGB 1.25mm <sup>2</sup>	600V-KGB 1.25mm <sup>2</sup>
Thermal fuse ~ Overheat protection thermostat		600V-KGB 1.25mm <sup>2</sup>	600V-KGB 1.25mm <sup>2</sup>	600V-KGB 1.25mm <sup>2</sup>	600V-KGB 1.25mm <sup>2</sup>
Fan motor ~ Magnetic switch		600V-KGB 2.0mm <sup>2</sup>	600V-KGB 2.0mm <sup>2</sup>	600V-KGB 2.0mm <sup>2</sup>	600V-KGB 2.0mm <sup>2</sup>

**Note : The wire specifications are depending on JIS standard.**

### USP15H USP20H



(Only USP15H)

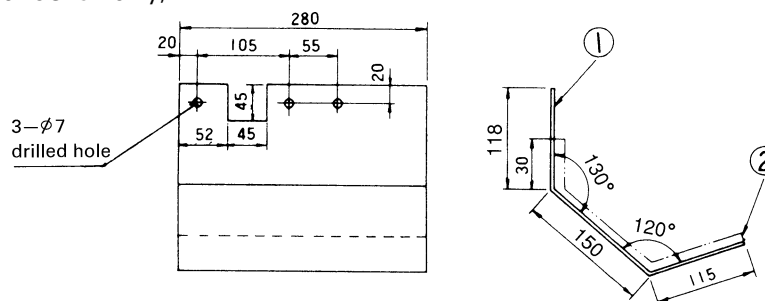
3-CH  
Install the switch by making its key groove below

Item	Model	USP15H USP20H
Electric heater ~ Magnetic contactor		600V-KGB 5.5mm <sup>2</sup>
Magnetic contactor ~ Terminal board		600V-HIV 5.5mm <sup>2</sup>
Terminal board ~ Thermal fuse / Overheat protection thermostat		600V-KGB 1.25mm <sup>2</sup>
Thermal fuse ~ Overheat protection thermostat		600V-KGB 1.25mm <sup>2</sup>
Fan motor ~ Magnetic switch		600V-KGB 2.0mm <sup>2</sup>

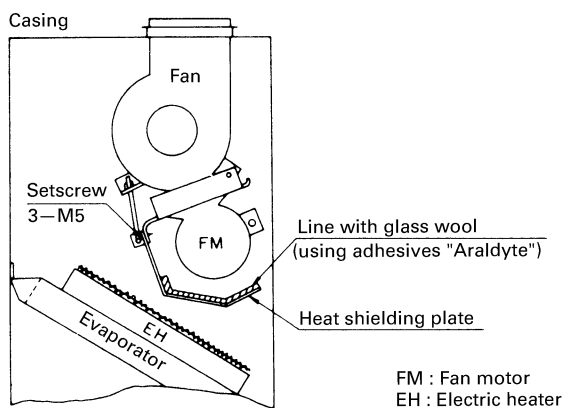
**Note : The wire specifications are depending on JIS standard.**

## ■ Mounting Procedure for Fan Motor Heat Insulation Plate

(for USP8H only)

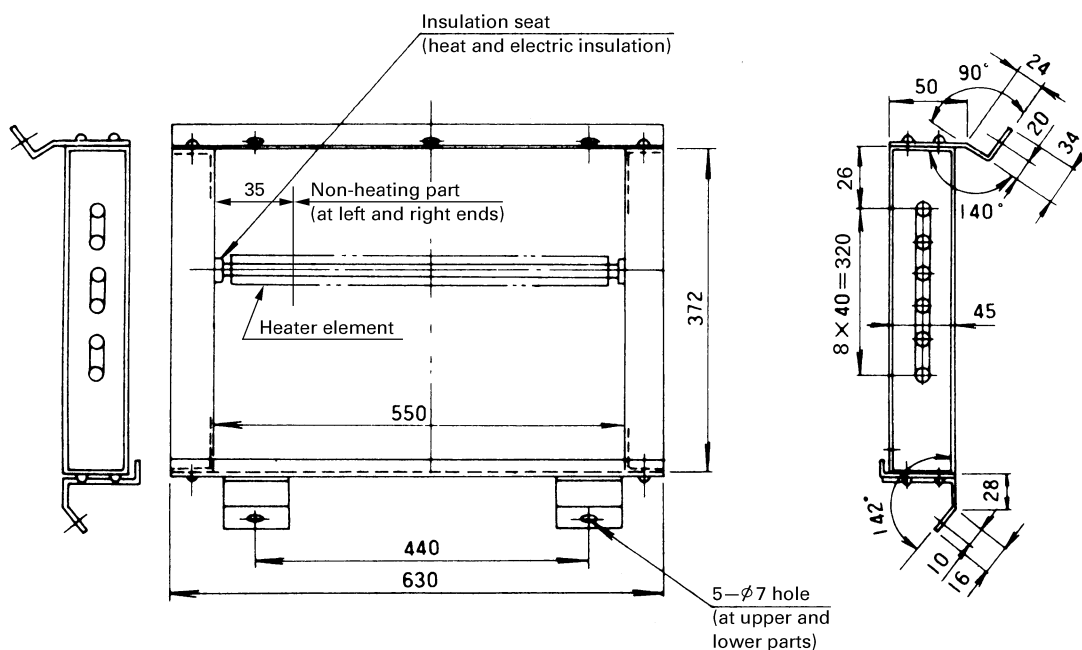


Part No.	Part Name	Material	Q'ty	Remark
①	Heat insulation plate	Steel	1	t2.3
②	Heat insulation material	Glass wool	1	t5



## ■ Electric Heater Parts

USP3H



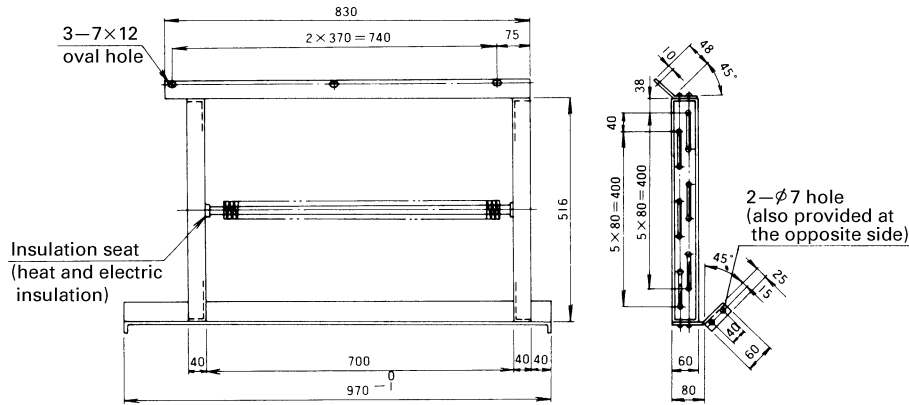
Name	Specification	Q'ty
Electric heater	3-phase, 440V / 200V, 60Hz, 9kW Power density: 1.6 W/cm <sup>2</sup> for heater w/fins, 4.1 W/cm <sup>2</sup> for heater wo/fins	1

### Notes

1. Dielectric strength test: 400V class, 2000V/min.
2. Insulation resistance:  $\geq 100M\Omega$ .
3. Heater connection: Star (Y) connection, 9 elements.

4. Painting specification:  
Heater / fins: Al heat resistant silver color (600°C)  
Heater frame: Al silver color
5. Working voltage should be specified separately upon arrangement.

## USP5H

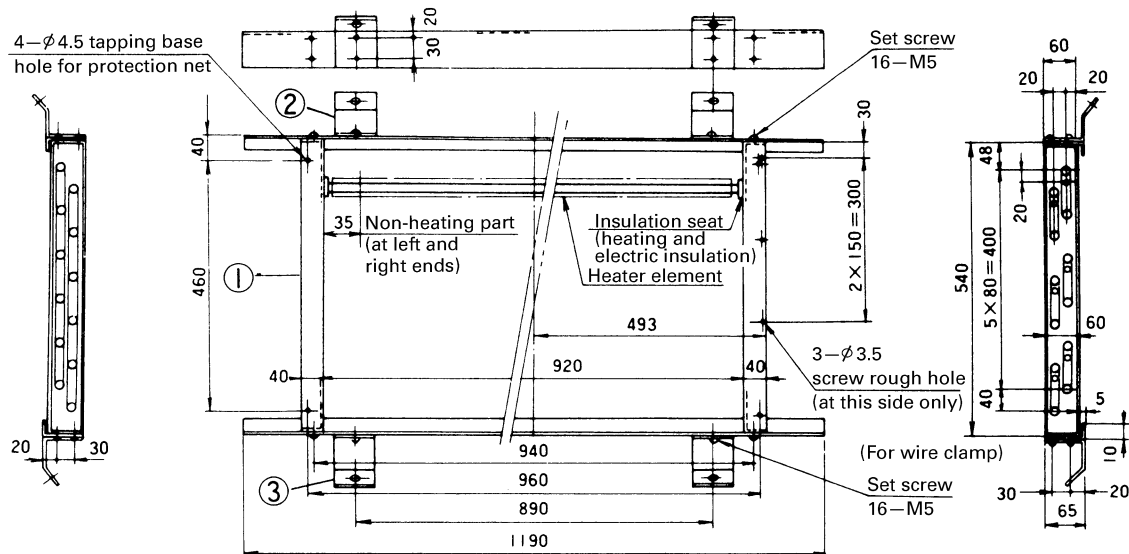


Name	Specification
Electric heater	7.5 + 7.5kW

### Notes

1. Dielectric strength test: 400V class, 2000V/min.
2. Insulation resistance:  $\geq 100M\Omega$ .
3. Heater connection: Star (Y) connection.
4. Painting specification:  
Heater / fins: Al heat resistance silver color (600°C)  
Heater frame: Al silver color
5. Working voltage should be specified separately upon arrangement.

## USP8H

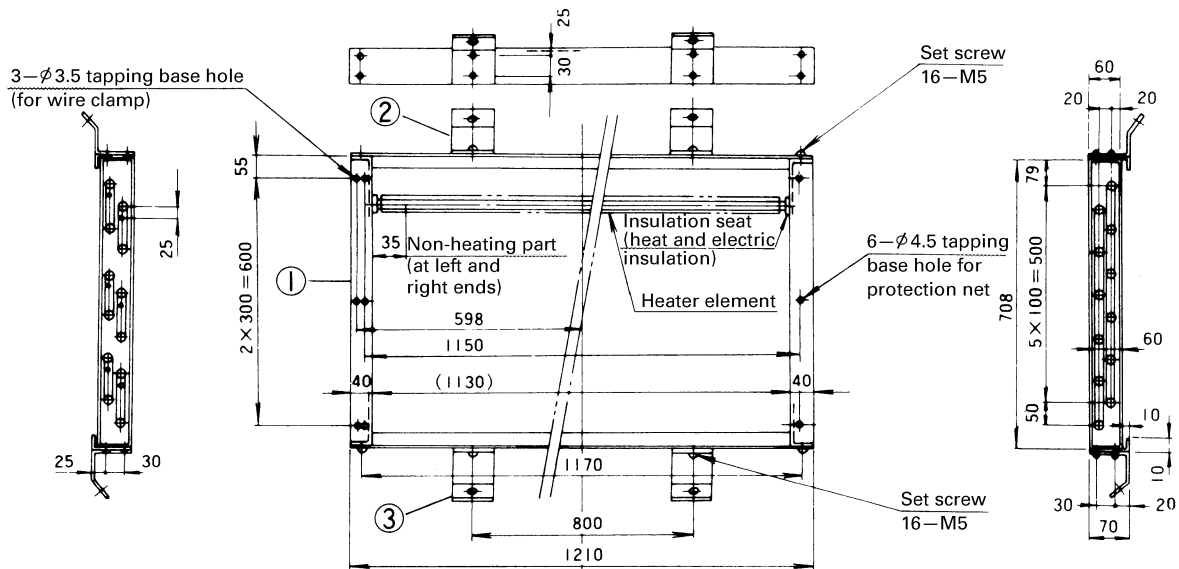


Part No.	Name	Specification	Q'ty
①	Electric heater	12 + 12 kW Power density: 1.8W/cm <sup>2</sup> for heater w/fins, 4.7 kW/cm <sup>2</sup> for heater wo/fins	1
②	Electric heater upper part fixing plate	Steel	2
③	Electric heater lower part fixing plate	Steel	2

### Notes

1. Dielectric strength test: 400V class, 2000V/min.
2. Insulation resistance:  $\geq 100M\Omega$ .
3. Heater connection: Star (Y) connection, 12 elements.
4. Painting specification:  
Heater / fins: Al heat resistant silver color (600°C)  
Heater frame: Al silver color
5. Working voltage should be specified separately upon arrangement.

## USP10H

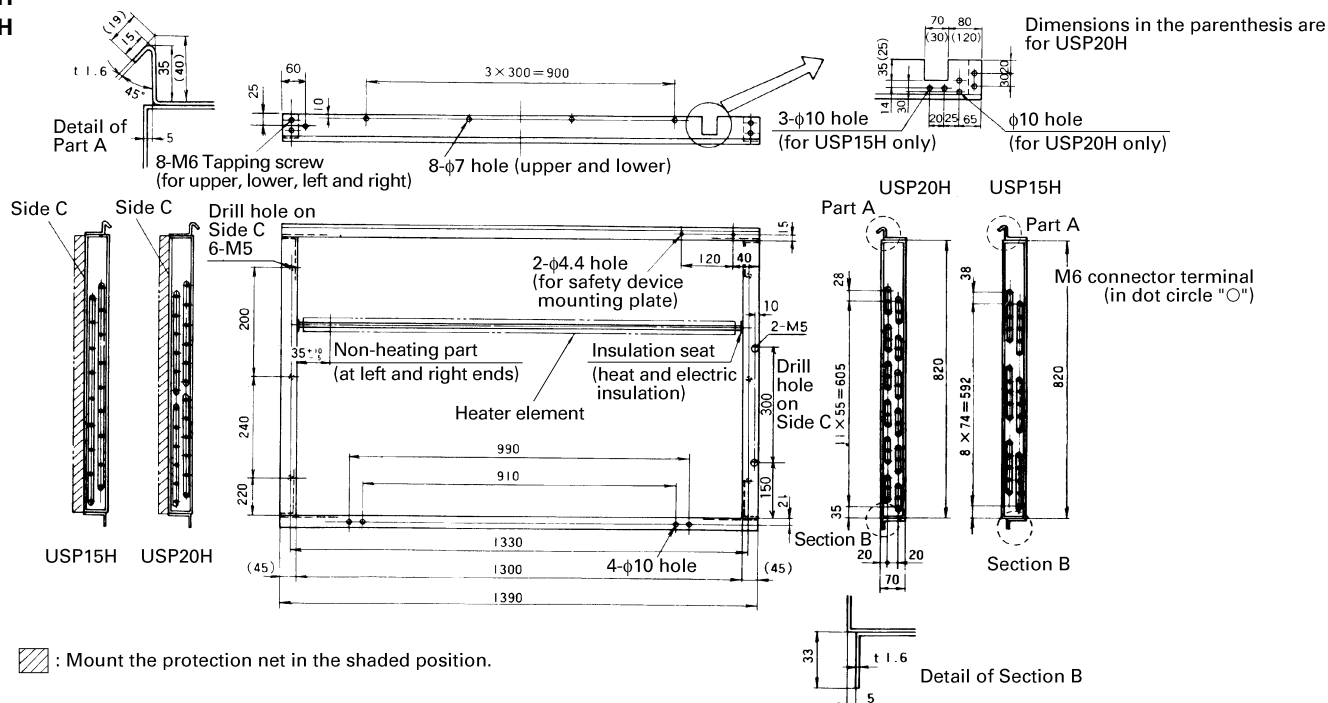


Part No.	Name	Specification	Q'ty
①	Electric heater	15 + 15 kW Power density: 1.8W/cm <sup>2</sup> for heater w/fins, 4.7 W/cm <sup>2</sup> for heater wo/fins	1
②	Electric heater upper part clamp plate	Steel	2
③	Electric heater lower part clamp plate	Steel	2

### Notes

- Dielectric strength test: 400V class, 2000V/min.  
200V class, 1500V/min.
- Insulation resistance:  $\geq 100\text{M}\Omega$ .
- Heater connection: Star (Y) connection, 12 elements.
- Painting specification:  
Heater / fins: Al heat resistant silver color (600°C)  
Heater frame: Al silver color
- Working voltage should be specified separately upon arrangement.

## USP15H USP20H



	Heater capacity	Number of heater element	Power supply	Power density
USP15H	24 + 24kW	9 + 9	440V 60Hz	Heater w/fins: 1.6W/cm <sup>2</sup> Heater wo/fins: 4.1W/cm <sup>2</sup>
USP20H	30 + 30kW	12 + 12	440V 60Hz	Heater w/fins: 1.6W/cm <sup>2</sup> Heater wo/fins: 4.1W/cm <sup>2</sup>

### Notes

1. Dielectric strength test: 400V class, 2000V/min.  
200V class, 1500V/min.
2. Insulation resistance:  $\geq 100M\Omega$ .
3. Heater connection: Star (Y) connection.

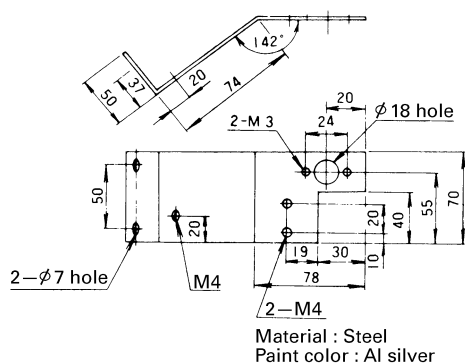
### 4. Painting specification:

Heater / fins: Al heat resistant silver color (600°C)  
Heater frame: Al silver color

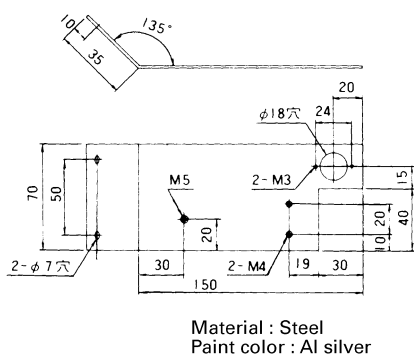
5. Working voltage should be specified separately upon arrangement.

## ■ Safety Device Mounting Plate

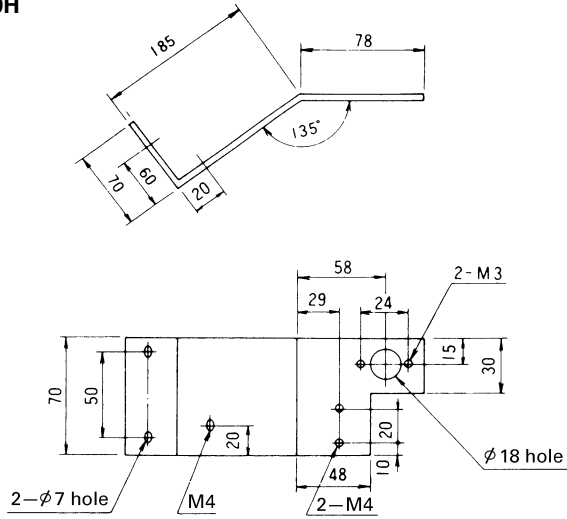
### USP3H



### USP5H

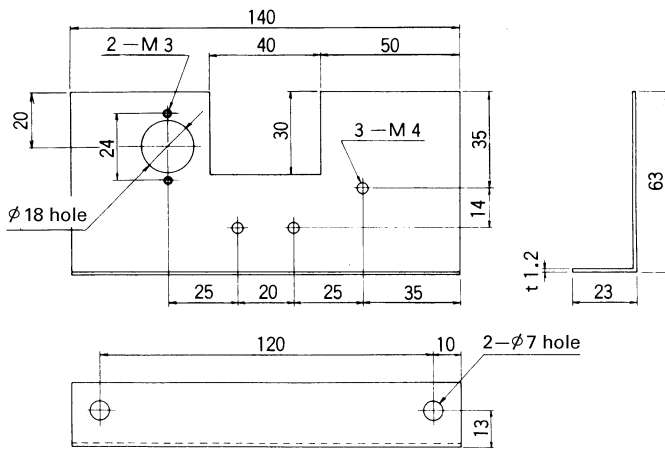


**USP8H**  
**USP10H**

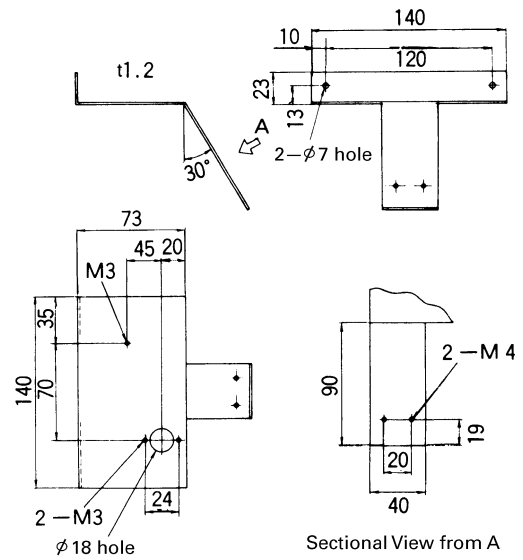


Paint color : Al silver on entire surface  
Material : Steel

**USP15H**



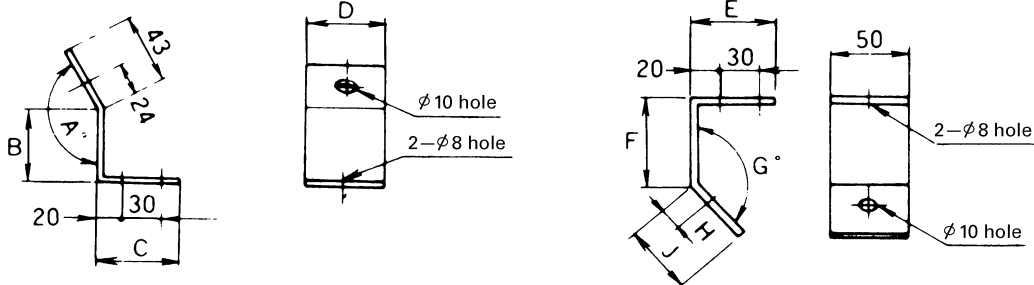
**USP20H**



## ■ Upper & Lower Part Clamp Plate

USP8H

USP10H

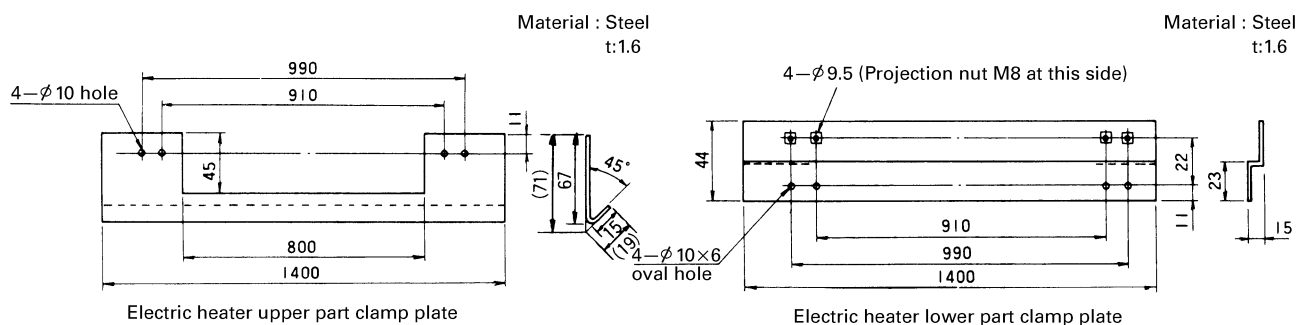


Model	A	B	C	D	E	F	G	H	J
USP8H	135	55	65	50	65	75	135	11	27
USP10H	140	30	70	70	60	30	140	36	48

Material : Steel  
Paint color : Al silver

USP15H

USP20H

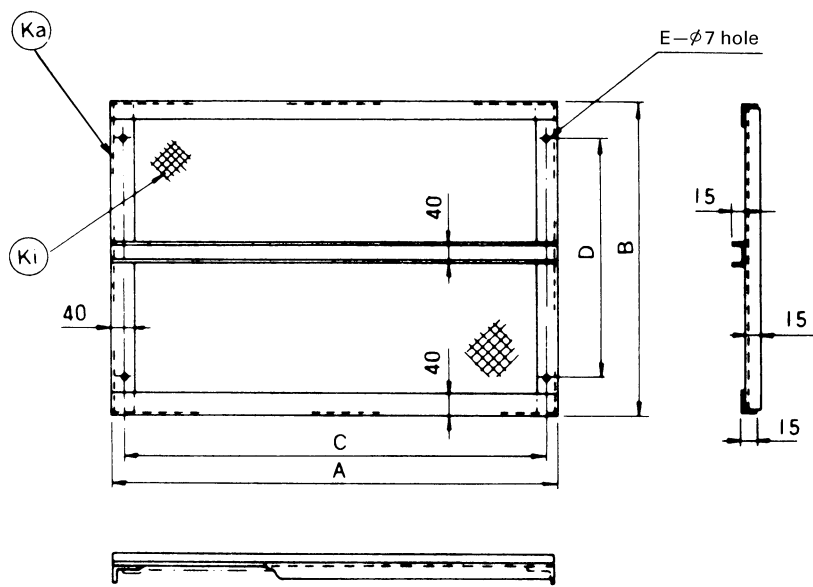


Electric heater upper part clamp plate

Electric heater lower part clamp plate



**■ Protection Net**  
**USP3H**  
**USP5H**  
**USP8H**  
**USP10H**

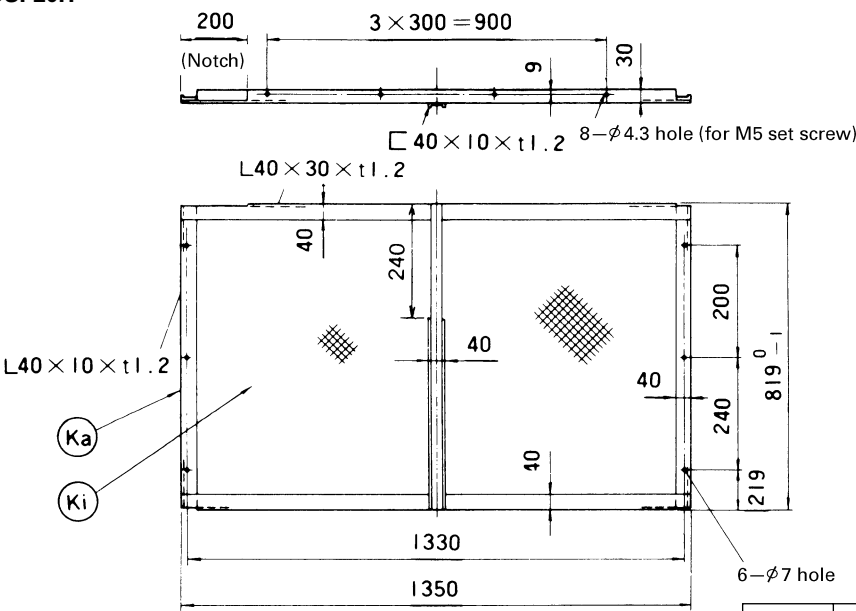


Part No.	Name	Material	Q'ty	Remarks
Ka	Protection frame	Steel	1 set	t:1.2
Ki	Protection net		1 set	Katsurada-made Type 2

Paint color: Al silver on entire surface

Applicable Model	A	B	C	D	E
USP5H	740	516	720	2×200=400	6
USP8H	990	530	940	460	4
USP10H	1200	695	1150	2×300=600	6

**USP15H**  
**USP20H**



Part No.	Name	Material	Q'ty	Remarks
Ka	Protection frame	Steel	1 set	
Ki	Protection net		1 set	Katsurada-made Type 2

Paint color: Silver color on entire surface

### 2.1.3 Tests to be done after Electric Heater Mounting

#### ■ Procedures of Confirmation Test and Test Run

1. Check the entire electric wiring again to see that all wires have been connected correctly.
2. Thoroughly check the wire clamps and set screws to see whether or not they are loosened.
3. Make sure that the electric heater is mounted at the correct position in the air conditioner, and also check to see whether or not there is found any wire coming in contact with electric heater element.
4. Check the capacity of the power fuse.
5. Conduct the insulation resistance test in the following manner before energizing the electric heater:  
Using a DC500V megger, measure the voltage between the earth and the point where the terminal at loading side of the electric contactor for electric heater is connected to the terminal for operation circuit, and make sure that the measured value is over 1 MΩ.
6. Check the fan rotating direction.  
To operate the fan,
  - (1) Set the cooling / heating selector switch in the control panel to HEAT.
  - (2) Press the run operation button FAN.Then, the green indication lamp lights up and the fan starts rotating. At this time check to see that the fan rotates in the direction of the arrow which is stamped on the fan motor.
7. After verifying that the fan is rotating (properly and in the correct direction), press COOL / HEAT button. Verify that hot air blows and heating operation proceeds. (At this time, turn the temperature controller knob to an appropriate position.)
8. Disconnect the wires from the fan motor or remove the fan belt to stop the fan rotation, and repeat the above steps 6 and 7 to energize the heater alone. In this state, verify that the overheat protection thermostat is actuated when temperature rises and the electricity running to the heater is stopped. In this case, be sure to remove the thermal fuse and shortcircuit the line before starting operation. (Make this confirmation without fail because this is a very important check to prevent fire accident due to the electric heater.)
9. When the actuation of the overheat protection thermostat has been duly confirmed, immediately turn off the power switches of the air conditioner and the electric heater, and conduct the insulation resistance test and make sure that the measured value is over 0.4MΩ.
10. When the actuation of the overheat protection thermostat has been duly confirmed, reconnect the wires to the fan motor or place the fan belt back in position, re-fit the thermal fuse and remove the shortcircuit wire and then, follow the above step 6 once again to make sure the heating operation is performed properly.

## 2.2 Steam Heater and Steam Spray Type Humidifier

### 2.2.1 Specifications

Applicable Model		USP3H	USP5H	USP8H	USP10H	USP15H	USP20H
Steam Heater	Heater capacity (kW)	15.7	22.0	31.4	41.9	62.8	83.7
	Heater specification	1 row×F.P.2.0mm	1 row×F.P.2.5mm	1 row×F.P.3.5mm			
	Heat source	0.4 MPa steam					
Steam Spray Type Humidifier	Humidifier capacity (kg/hr.)	1.6	2.6	3.7	4.7	6.8	8.4
	Heat source	0.0035 MPa steam					

### 2.2.2 Mounting Procedure and Parts Illustrations

#### ■ Mounting Work Procedure

USP3H

USP5H

USP8H

USP10H

#### 1. Mounting Work Procedure

1. Remove the suction grille, front plate (upper) and rear plate.
2. Remove the rubber bush from the side plate.
3. Align the center of the steam heater with that of the casing, and drill holes on site.
4. To mount the steam spray type humidifier, with the cap and socket mounted to its spray nozzle, fix the steam spray type humidifier securely to the steam heater.
5. Mount the steam heater thus assembled to the evaporator.
6. Wrap the pieces of asbestos round the joints for steam heater and steam spray nozzle at the portion 100 mm from the joint flange, and fix them tightly by the brass wire. (This measure is to prevent the steam piping from coming in contact with the casing.)
7. Screw each of the joints into the heater inlet/outlet pipe and spray inlet pipe.
8. Place the suction grille, front plate (upper) and rear plate back in position.

#### 2. Cautions on Mounting Work

- The mounting work illustration in the following page shows the right-hand setup of the steam heater. For the left-hand setup of it, remove the heater upper and lower frames, give the heater 180° turn, re-fit the frames and fix them securely.
- Replace the steam spray nozzle socket with the steam spray nozzle cap and vice versa.
- When the steam heater and the steam spray type humidifier are unused for a long period of time, drain the water inside piping without fail.

USP15H  
USP20H

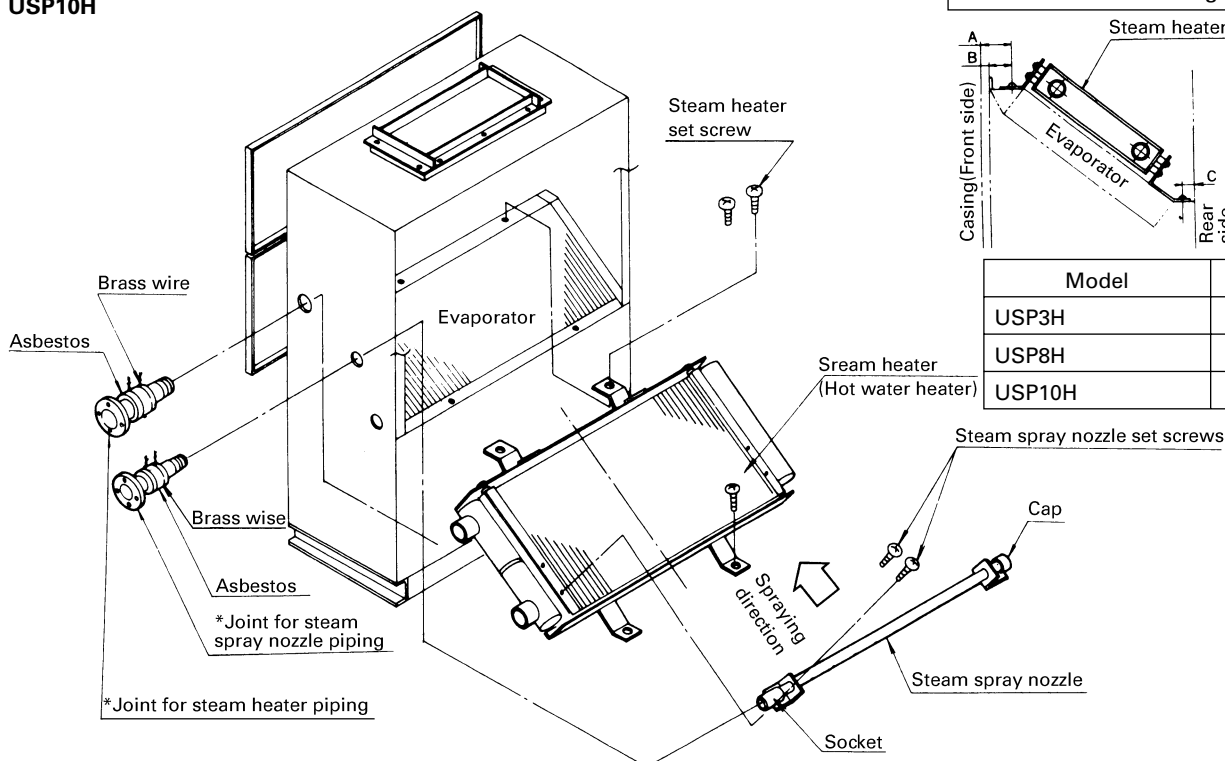
### 1. Mounting Work Procedure

1. Remove the top plate (front) and the left and right side plates (upper). (If there is not enough servicing space above the air conditioner to place the steam heater in it, the side plate only may be removed for this work.)
2. Mount the steam heater upper part and lower part supporting plates to the evaporator and fix them with set screws.
3. To mount the steam spray type humidifier, with the cap and socket mounted to its spray nozzle, fix the steam spray type humidifier securely to the steam heater.
4. With the upper part of the steam heater hung on the steam heater upper part supporting plate, screw its lower part into the steam heater lower part supporting plate.
5. Remove the rubber bush from the side plate, and mount the top plate and side plates.
6. Wrap the pieces of asbestos round the joints for steam heater and steam spray nozzle at the portion 100 mm from the joint flange, and fix them tightly by the brass wire (This measure is to prevent the steam piping from coming in contact with the casing.)
7. Screw each of the joints into the heater inlet/outlet pipe and spray inlet pipe.

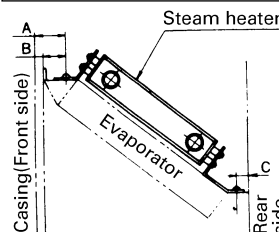
### 2. Cautions on Mounting Work

- The mounting work illustration in the following page shows the right-hand setup of the steam heater. For the left-hand setup of it, remove the heater upper part and lower part supporting plates, give the heater 180° turn, re-fit the supporting plates.
- Replace the steam spray nozzle socket with the steam spray nozzle cap and vice versa.
- When the steam heater and the steam spray type humidifier are unused for a long period of time, drain the water inside the piping without fail.

USP3H  
USP8H  
USP10H



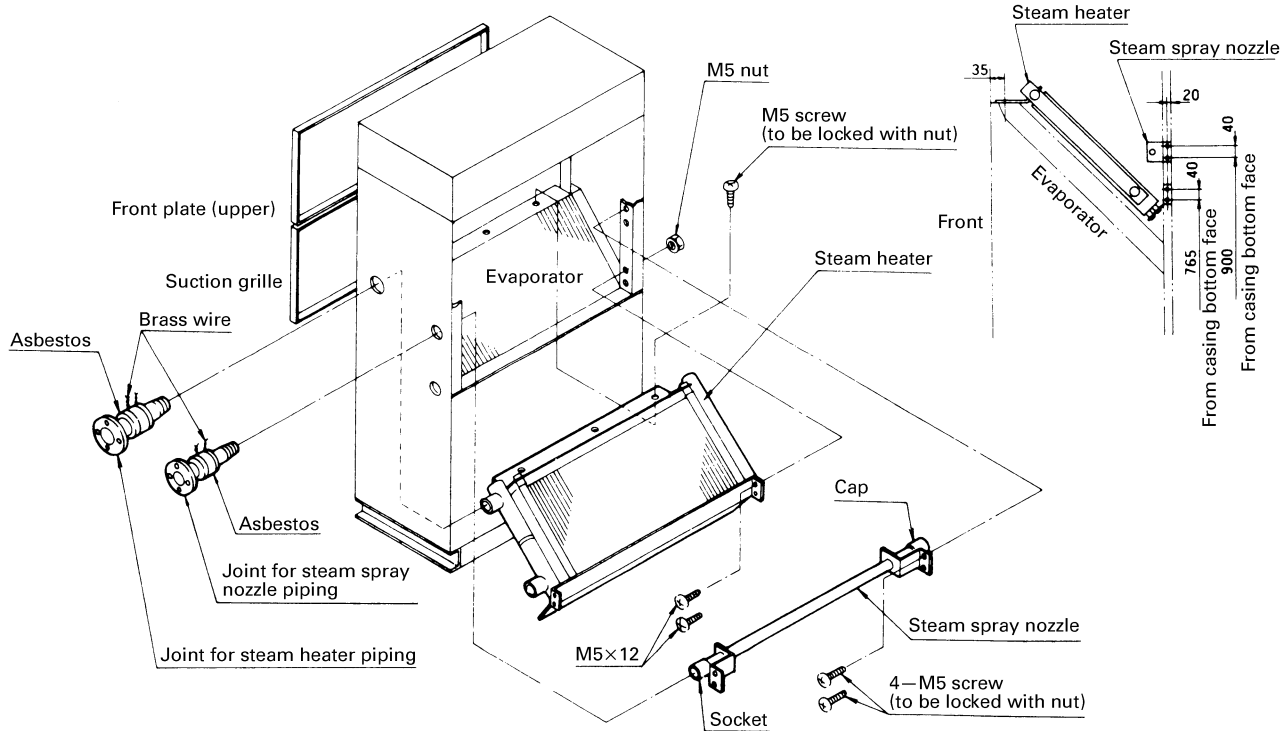
Steam Heater Mounting Position



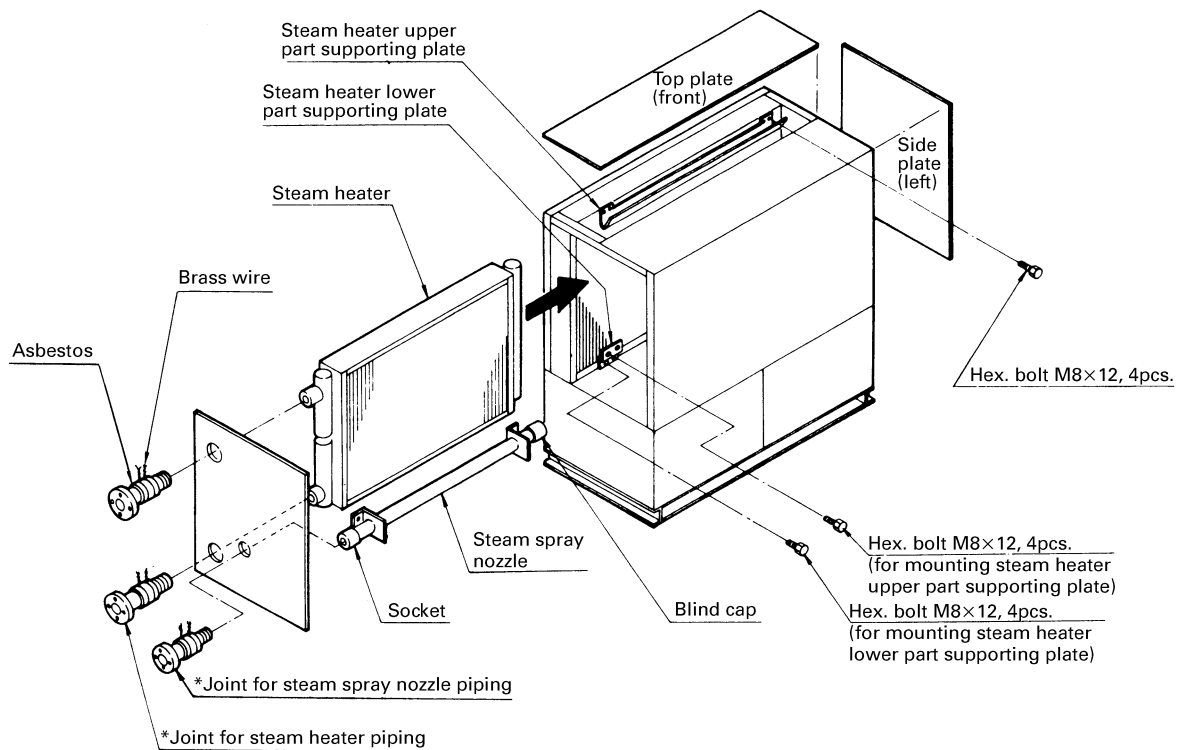
Model	A	B	C
USP3H	93	–	11
USP8H	–	54	20
USP10H	–	51	20

## USP5H

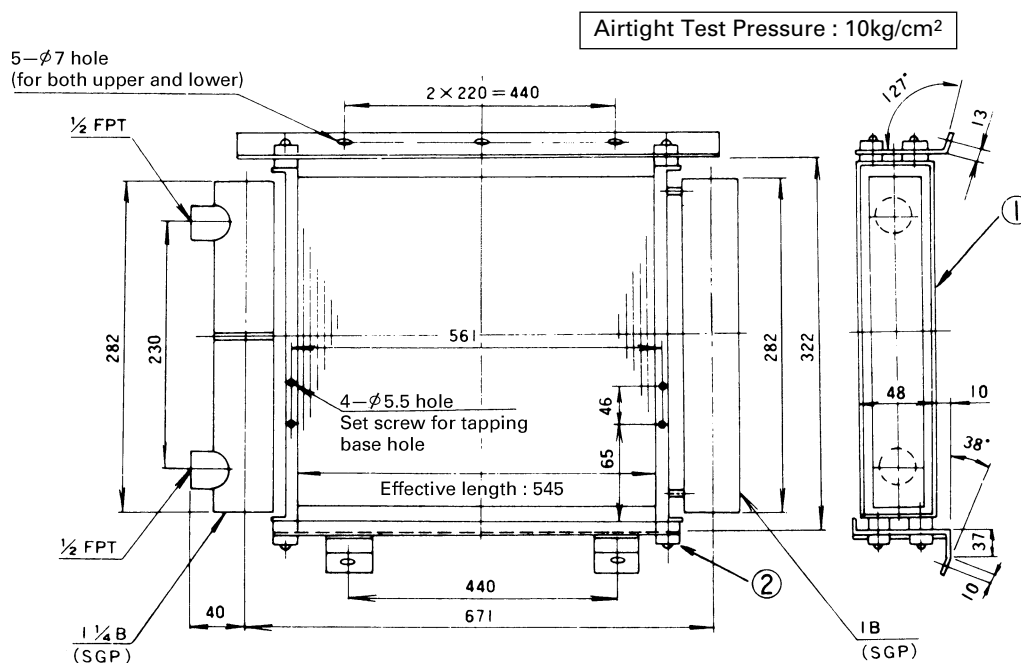
Steam Heater & Steam Spray Nozzle Mounting Position



## USP15H USP20H

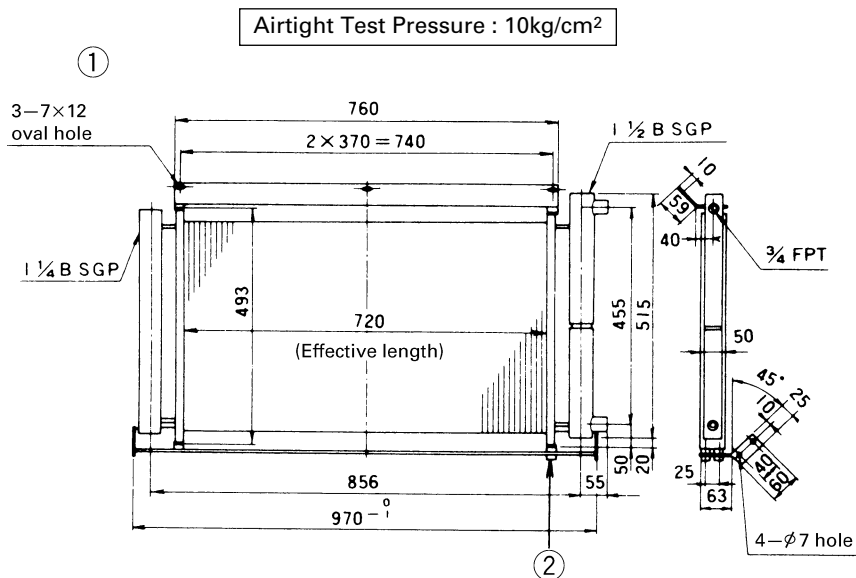


■ Parts Illustration (Steam Heater)  
USP3H



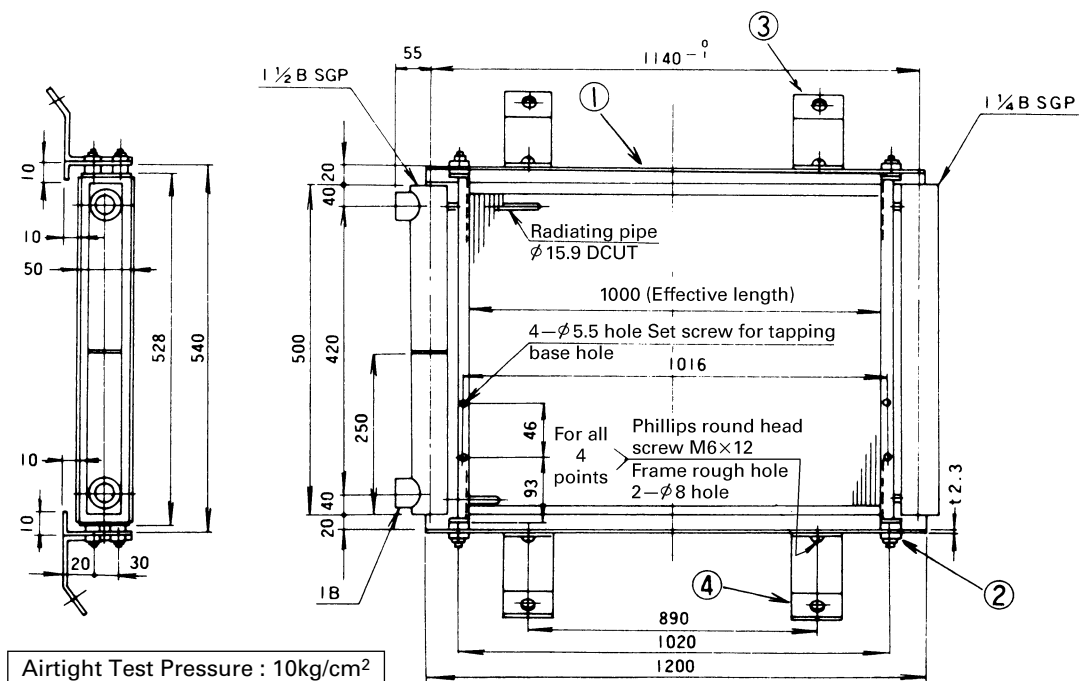
Part No.	Part Name	Specification	Q'ty	Remarks
①	Steam heater nozzle	1 row $\times$ 10 stages $\times$ F.P.2.0mm, $\phi 9.5$ copper pipe	1	
②	Heat insulation plate	Bakelite	16	For detailed dimensions, refer to "Steam heater common parts".

USP5H



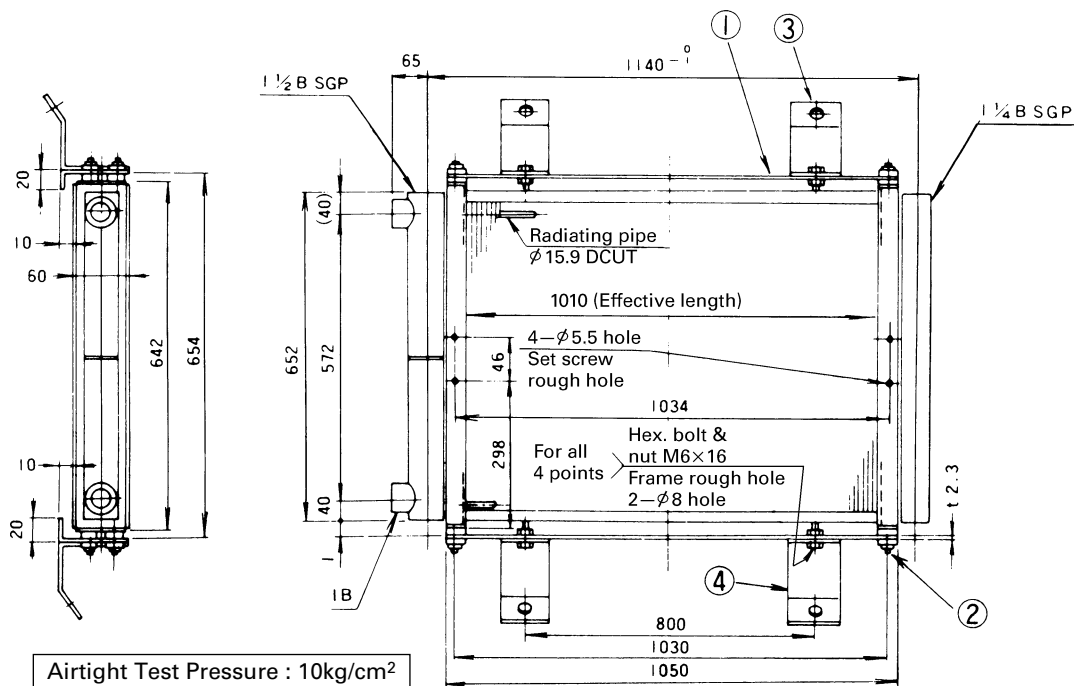
Part No.	Part Name	Specification	Q'ty	Remarks
①	Steam heater	1 row $\times$ 12 stages $\times$ F.P.2.5mm, $\phi 15.9$ copper pipe	1	
②	Heat insulation plate	Bakelite	16	For detailed dimensions, refer to "Steam heater common parts".

## USP8H



Part No.	Part Name	Specification	Q'ty	Remarks
①	Steam heater	1 row X12 stagesXF.P.3.5mm, φ15.9 copper pipe	1	
②	Heat insulation plate	Bakelite	16	For detailed dimensions, refer to "Steam heater common parts".
③	Heater upper part fixing plate	Steel t=2.3mm	2	For detailed dimensions, refer to "Steam heater common parts".
④	Heater lower part fixing plate	Steel t=2.3mm	2	For detailed dimensions, refer to "Steam heater common parts".

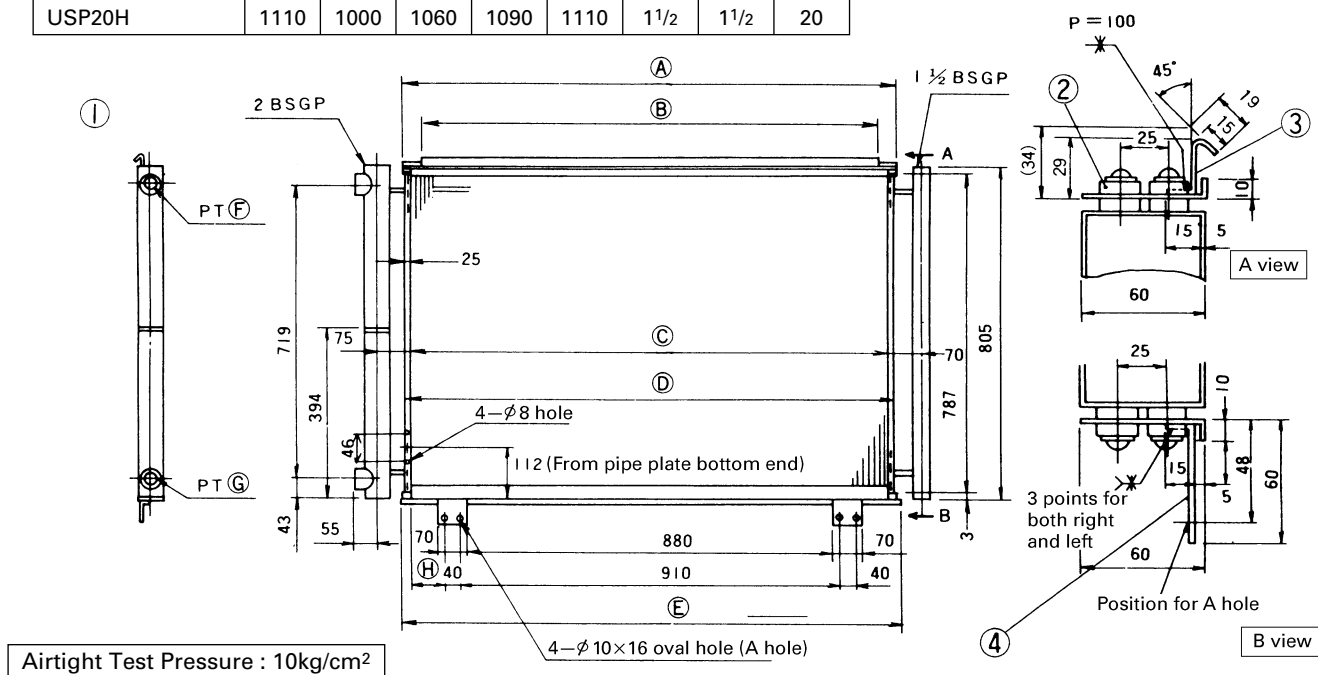
## USP10H



Part No.	Part Name	Specification	Q'ty	Remarks
①	Steam heater	1 row X10 stagesXF.P.3.5mm, φ15.9 copper pipe	1	
②	Heat insulation plate	Bakelite	16	For detailed dimensions, refer to "Steam heater common parts".
③	Heater upper part fixing plate	Steel t=2.3mm	2	For detailed dimensions, refer to "Steam heater common parts".
④	Heater lower part fixing plate	Steel t=2.3mm	2	For detailed dimensions, refer to "Steam heater common parts".

**USP15H**  
**USP20H**

	A	B	C	D	E	F	G	H
USP15H	1200	1100	1150	1180	1200	1 1/4	3/4	65
USP20H	1110	1000	1060	1090	1110	1 1/2	1 1/2	20

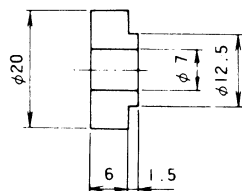


Part No.	Part Name	Specification	Q'ty	Remarks
①	Steam heater	1 row ×20 stages×F.P.3.5mm	1	φ9.5 copper pipe
②	Heat insulation plate	Bakelite	16	
③	Upper part supporting plate	Steel	1	t=1.6
④	Lower part supporting plate	Steel	2	t=1.6

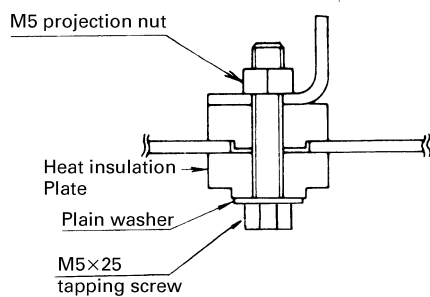
● **Steam Heater Common Parts**

**Heat Insulation Plate**

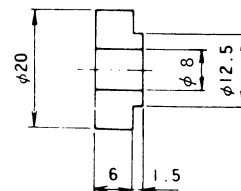
USP3H  
USP5H  
USP8H  
USP10H



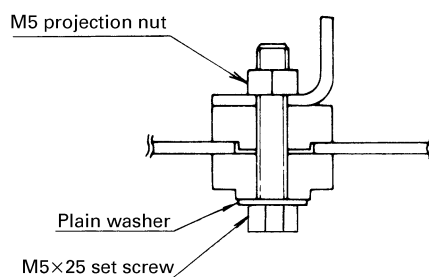
Heat Insulation Plate Mounting Procedure



USP15H  
USP20H

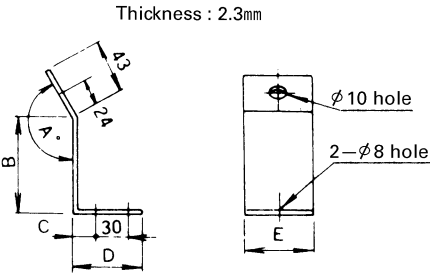


Heat Insulation Plate Mounting Procedure

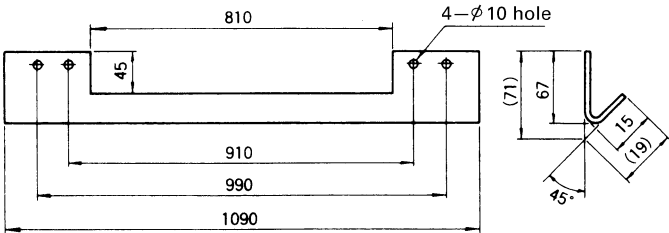




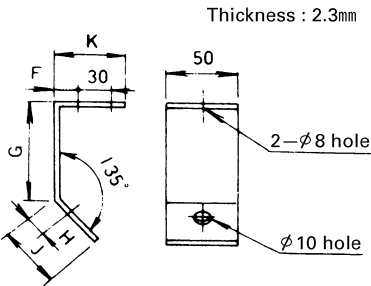
**Heater Upper Part Fixing Plate**  
**USP8H**  
**USP10H**



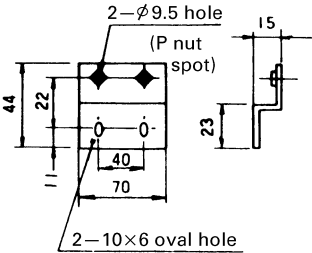
**USP15H**  
**USP20H**



**Heater Lower Part Fixing Plate**  
**USP8H**  
**USP10H**

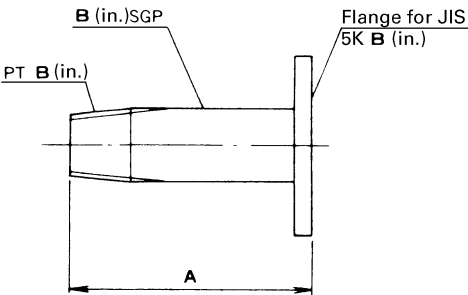


**USP15H**  
**USP20H**



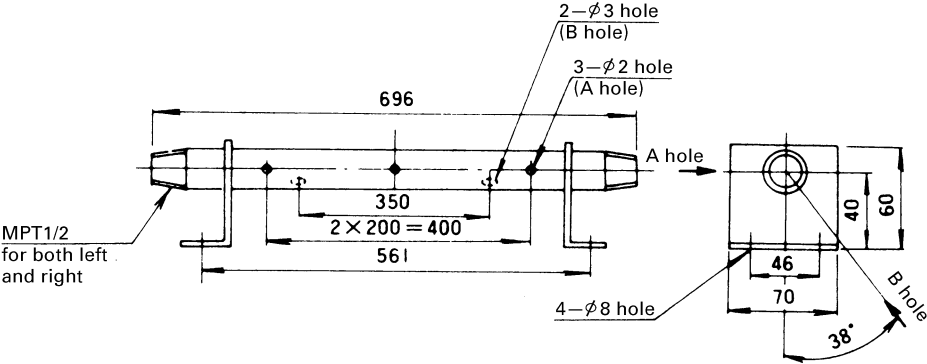
	A	B	C	D	E	F	G	H	J	K
USP8H	135	55	20	60	50	20	75	11	27	60
USP10H	140	83	25	70	70	25	32	36	48	70

**Piping Joint**  
**USP3H~USP20H**



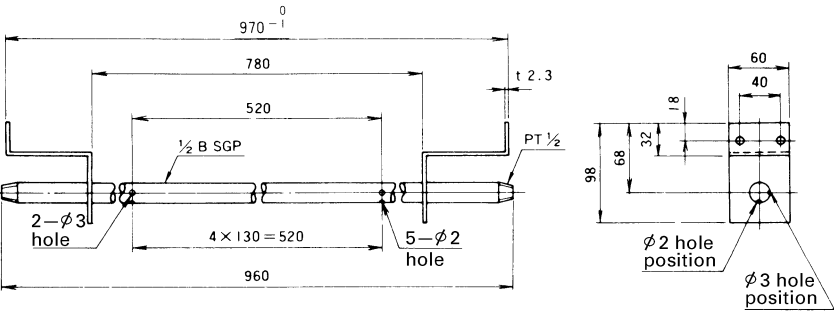
For Steam Heater			For Steam Spray		
Applicable Model	A	B	Applicable Model	A	B
USP3H	136	1/2	USP3H	140	1/2
USP5H	155	3/4	USP5H	133	1/2
USP8H	165	1	USP8H	148	1/2
USP10H	157	1	USP10H	150	3/4
USP15H...For inlet	212	1 1/4	USP15H	256	3/4
USP15H...For outlet	208	3/4	USP20H	186	3/4
USP20H	257	1 1/2			

● Steam Spray Type Humidifier  
 USP3H



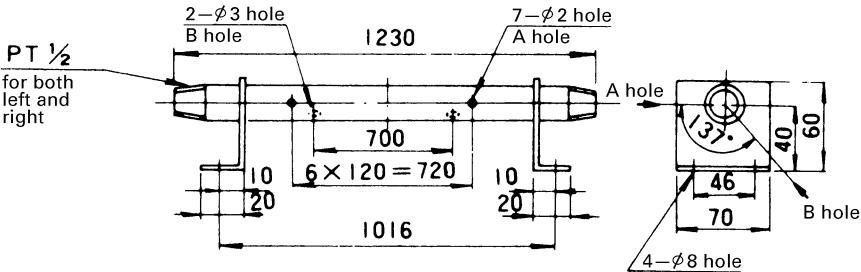
Part Name	Material	Q'ty	Remarks
Steam spray	Steel	1	1/2B

USP5H



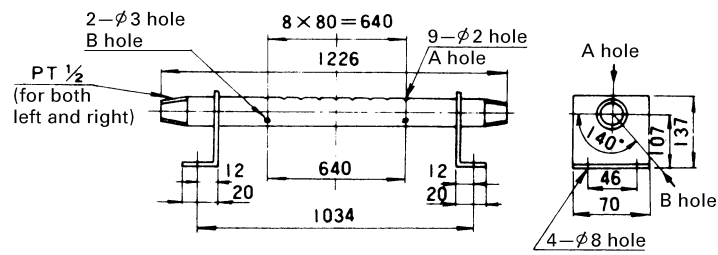
Part Name	Material	Q'ty	Remarks
Steam spray	Steel	1	1/2B, t:2.3

USP8H



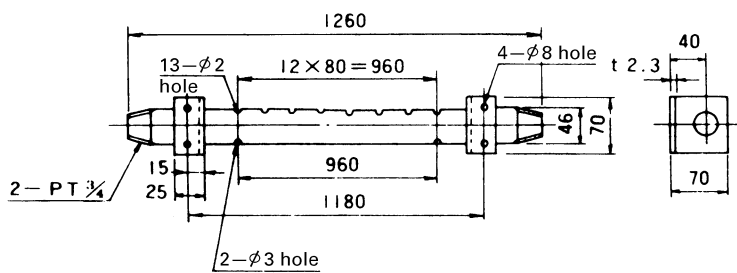
Part Name	Material	Q'ty	Remarks
Steam spray	Steel	1	1/2B, t:2.3

### USP10H



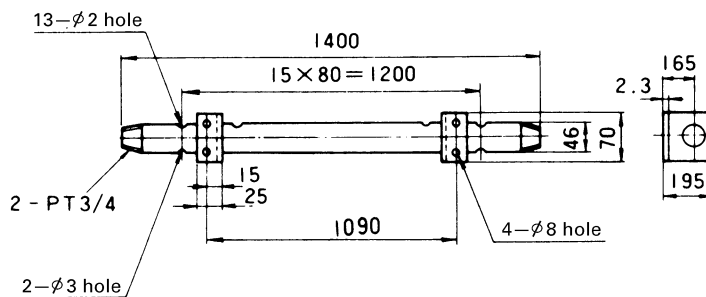
Part Name	Material	Q'ty	Remarks
Steam spray	Steel	1	$\frac{1}{2}$ B, t:2.3

### USP15H



Part Name	Material	Q'ty	Remarks
Steam spray	Steel	1	$\frac{3}{4}$ B, t:2.3

### USP20H



Part Name	Material	Q'ty	Remarks
Steam spray	Steel	1	$\frac{3}{4}$ B, t:2.3

## 3. Rear Duct Connection

### 3.1 USP5H

#### 3.1.1 Cautions

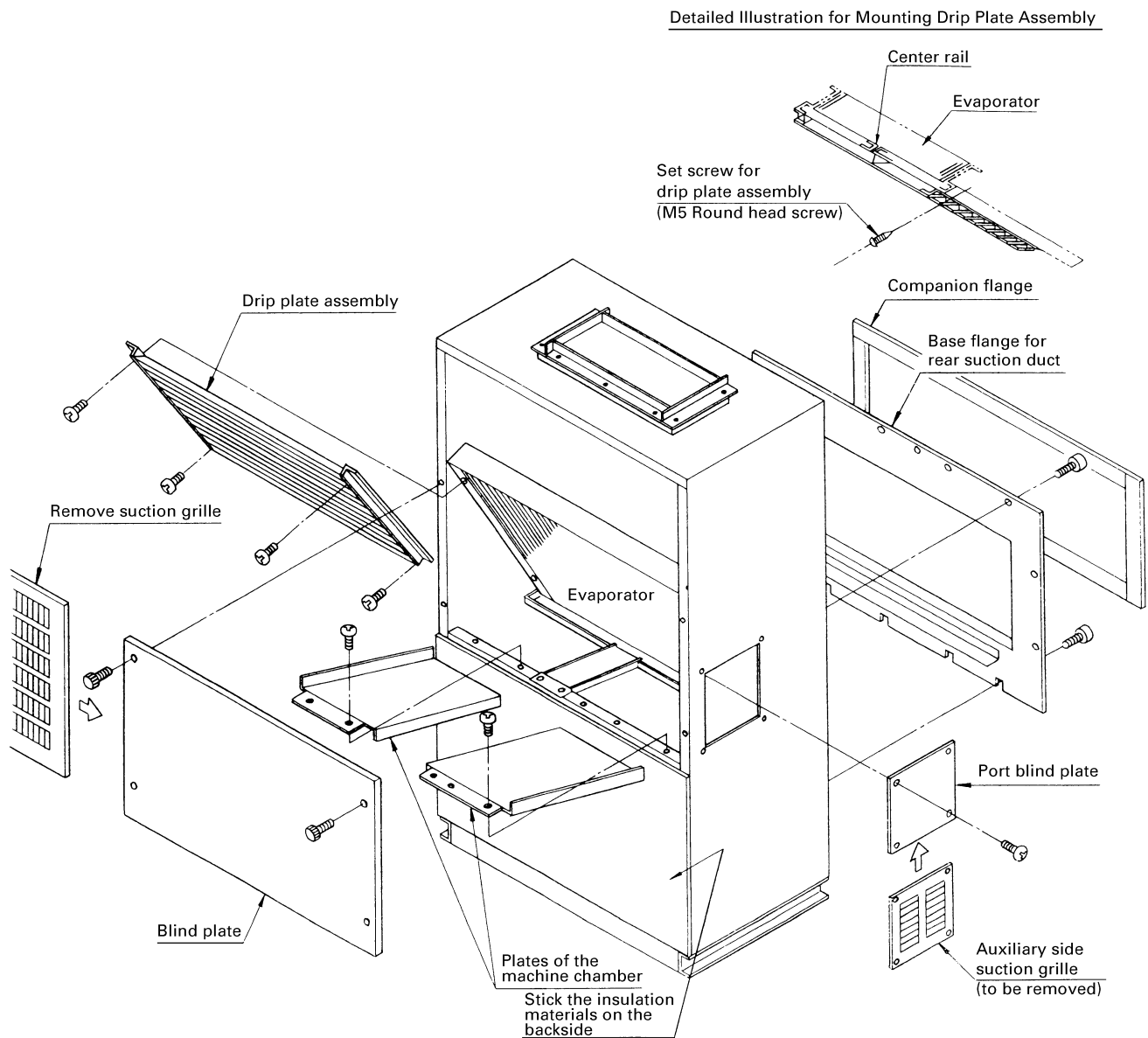
##### 1. Cautions on Mounting Work

- Perform the mounting work by referring to the mounting procedure illustration.
- Be sure to fix the drip plate assembly so that drain water should not drop into the machine chamber.
- Glass fiber piece to be used as soundproof material should have its surfaces and ends treated.  
(This treatment is to prevent glass fiber from scattering.)

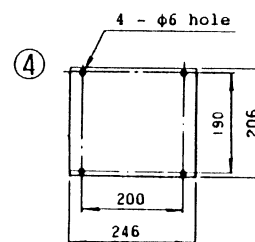
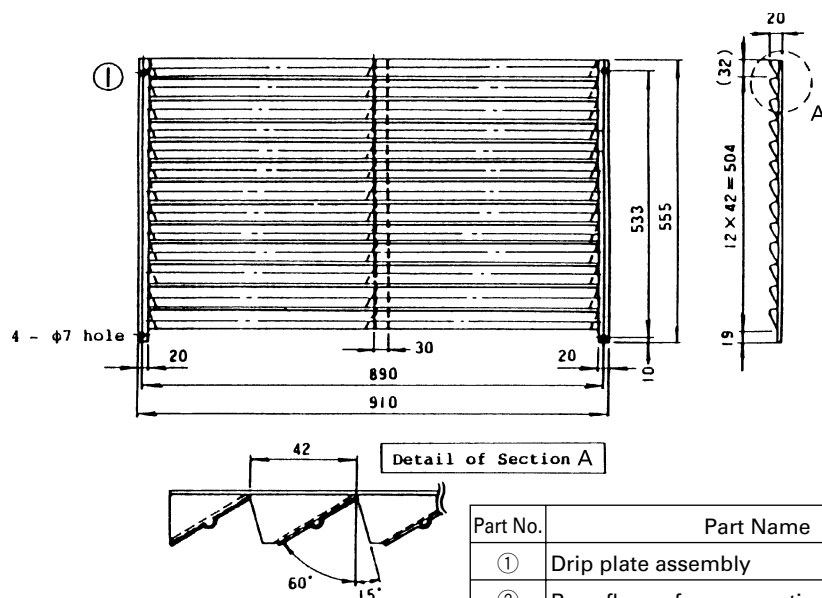
##### 2. Cautions for Use

Do not use this suction duct connection assembly if a negative pressure of higher than 10 mmH<sub>2</sub>O is applied to the suction side. For such a case, use the front suction duct assembly.

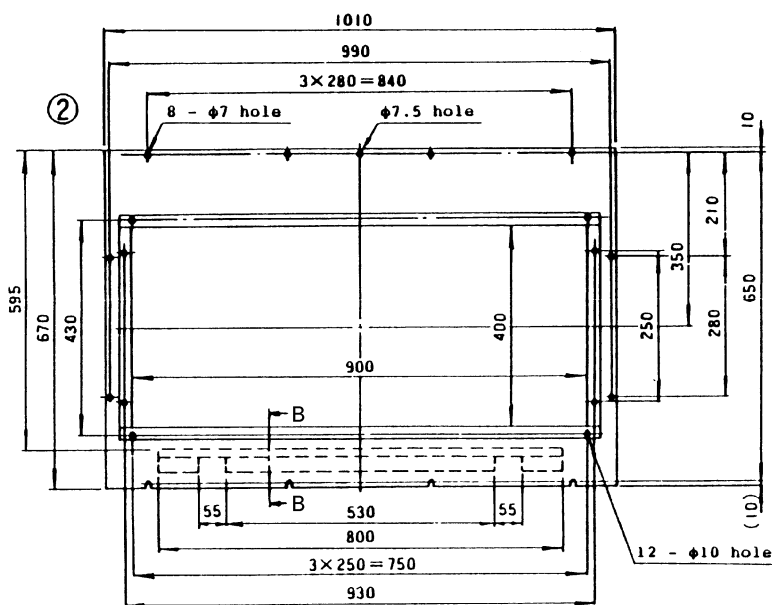
#### 3.1.2 Mounting Procedure



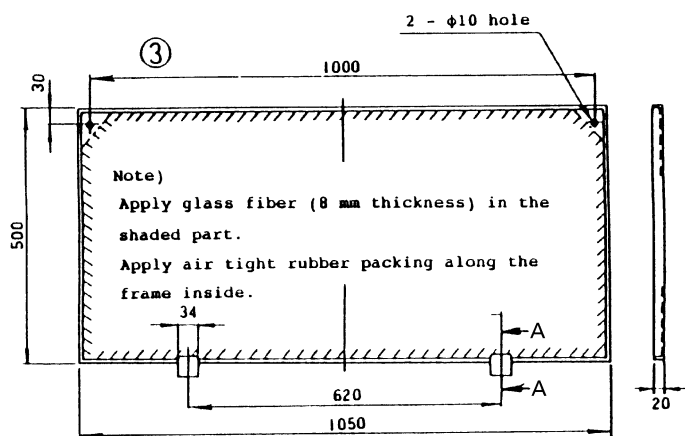
### 3.1.3 Parts



Part No.	Part Name	Material	Q'ty / set	Remarks
①	Drip plate assembly	Steel	1 set	t:1.0, 1.2
②	Base flange for rear suction duct	Steel	1 set	t:1.0, 1.6
③	Blind plate	Steel	1 set	t:1.0, 2.3
④	Aux. suction port blind plate	Steel	2	t:1.0



B-B sectional view



A-A sectional view

## 3.2 USP8H / USP10H

### 3.2.1 Cautions

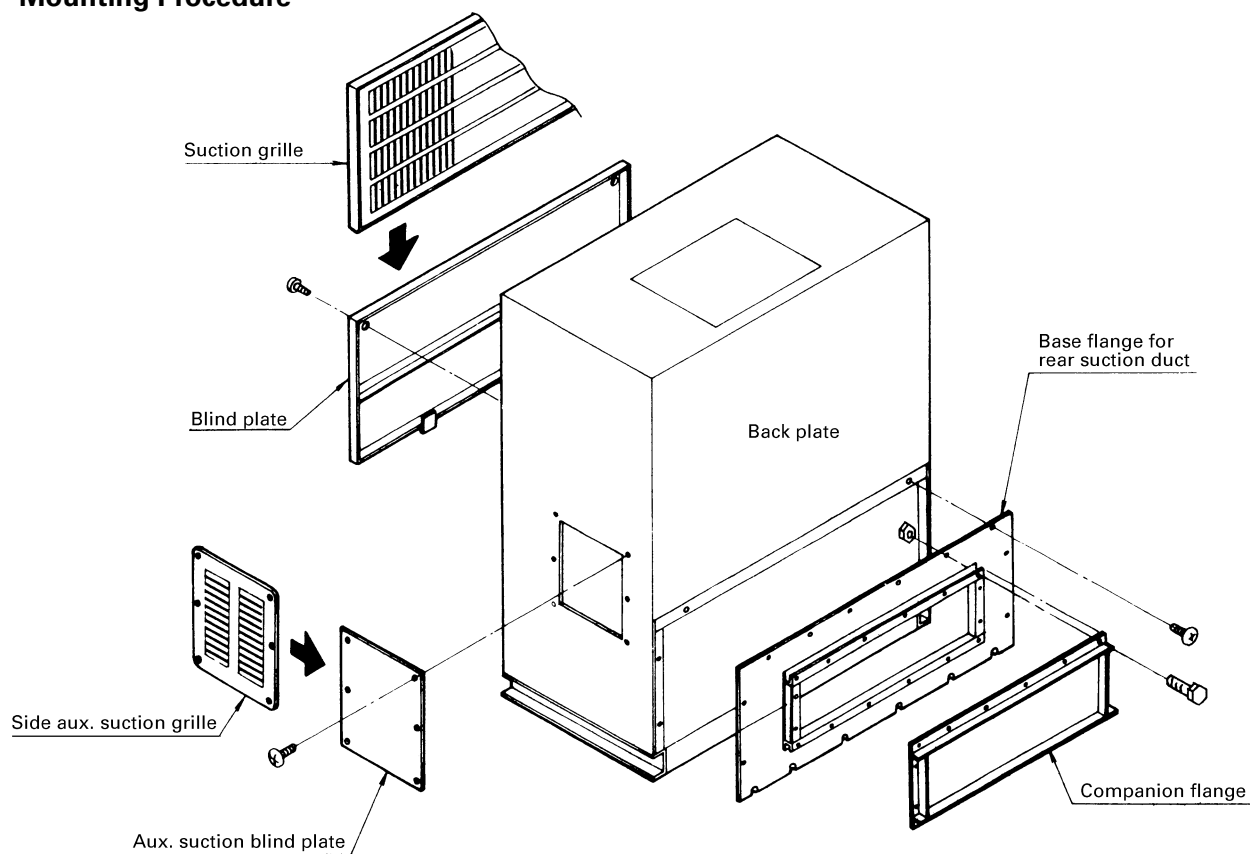
#### 1. Cautions on Mounting Work

- Perform the mounting work by referring to the mounting procedure illustration.
- Glass fiber piece to be used as soundproof material should have its surfaces and ends treated.  
(This treatment is to prevent glass fiber from scattering.)

#### 2. Cautions for Use

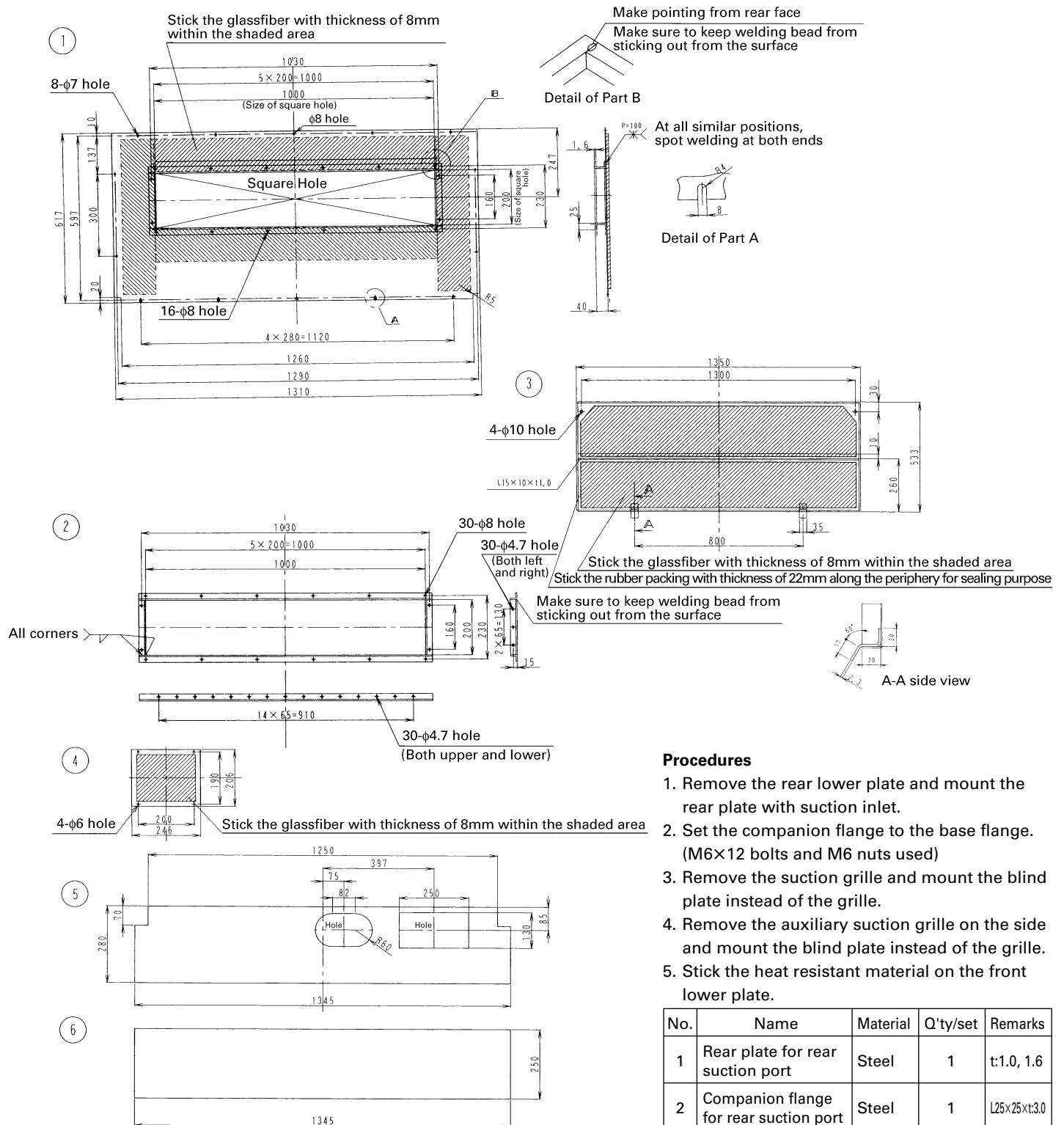
Be sure to apply canvas for the joint between the air conditioner and the duct in order to prevent the duct system from vibrating.

### 3.2.2 Mounting Procedure



### 3.2.3 Parts Illustration

#### USP8H



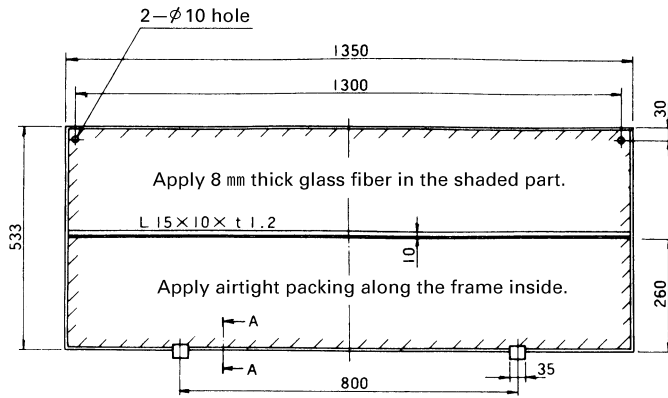
#### Procedures

1. Remove the rear lower plate and mount the rear plate with suction inlet.
2. Set the companion flange to the base flange. (M6×12 bolts and M6 nuts used)
3. Remove the suction grille and mount the blind plate instead of the grille.
4. Remove the auxiliary suction grille on the side and mount the blind plate instead of the grille.
5. Stick the heat resistant material on the front lower plate.

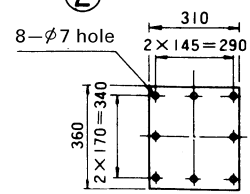
No.	Name	Material	Q'ty/set	Remarks
1	Rear plate for rear suction port	Steel	1	t:1.0, 1.6
2	Companion flange for rear suction port	Steel	1	L25×25×t:3.0
3	Blind plate for rear suction port	Steel	1	t:1.0, 2.3
4	Blind plate for auxiliary suction port	Steel	2	t:1.0
5	Insulation material against heat for front plate (upper, lower)	glassfiber	1	t:8.0
6	Insulation material against heat for front plate (upper, lower)	glassfiber	1	t:8.0

# USP10H

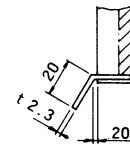
①



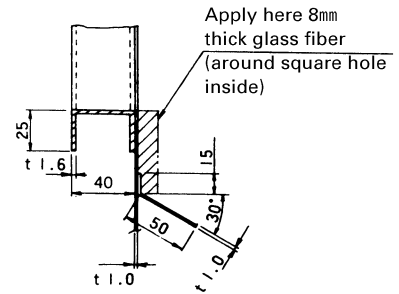
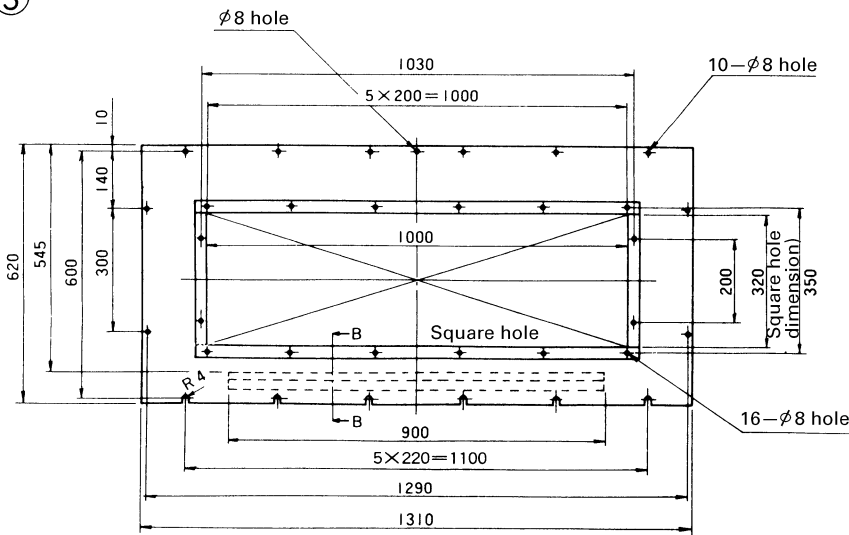
②



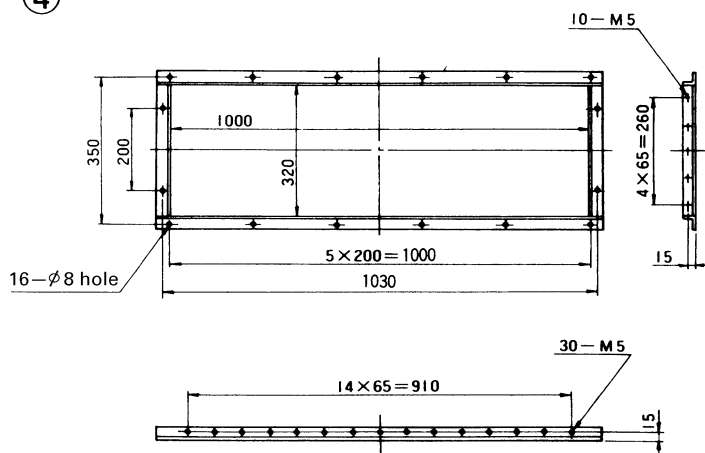
A-A sectional view



③



④



Part No.	Part Name	Material	Q'ty / set	Remarks
①	Suction blind plate	Steel	1	t:1.0, 1.2, 2.3
②	Aux. suction blind plate	Steel	2	t:1.0
③	Base flange for rear suction duct	Steel	1	t:1.0, 1.6
④	Companion flange for rear suction port	Steel	1	L25×25×t:3



## 4. Fresh Air Intake Duct Connection

### 4.1 Cautions

USP3H~USP10H

#### 1. Cautions on Mounting Work

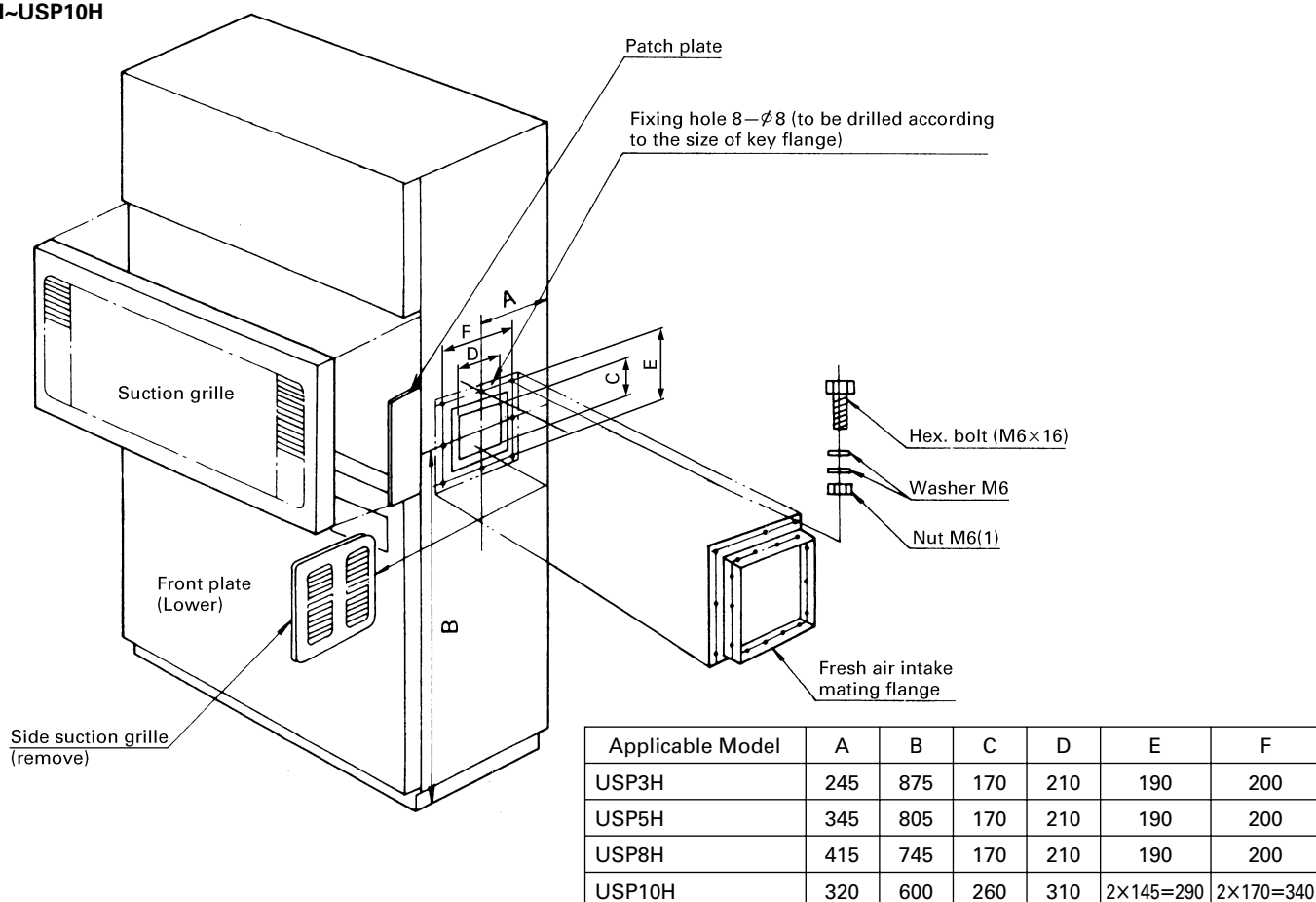
- Perform the mounting work by referring to the mounting procedure illustration.
- The mounting work procedure herein, which is for the right-hand setup of the unit, also applies to the left-hand setup.
- When making the side opening, be sure to apply a patch plate from inside. Otherwise, the internal coolant pipes may break.

#### 2. Cautions for use

Be sure to apply canvas to the joint of the air conditioner and the duct in order to prevent the duct system and the air conditioner from vibrating.

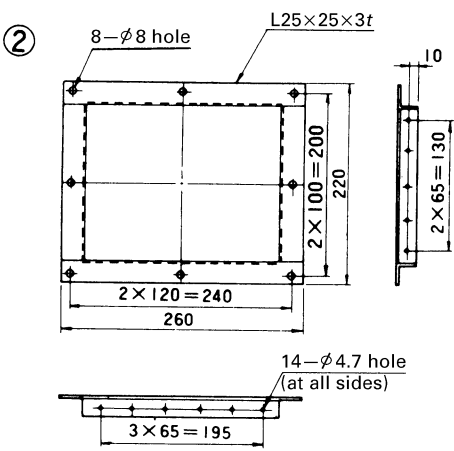
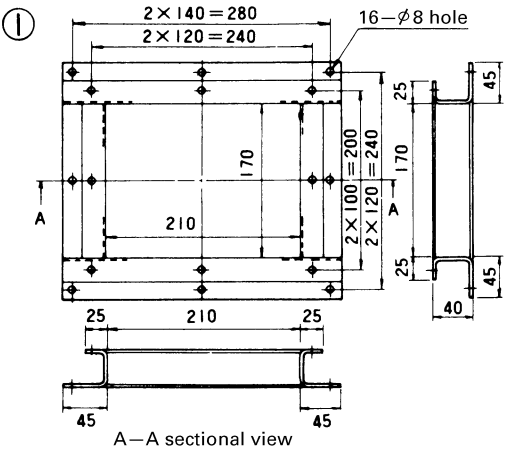
### 4.2 Mounting Procedure

USP3H~USP10H



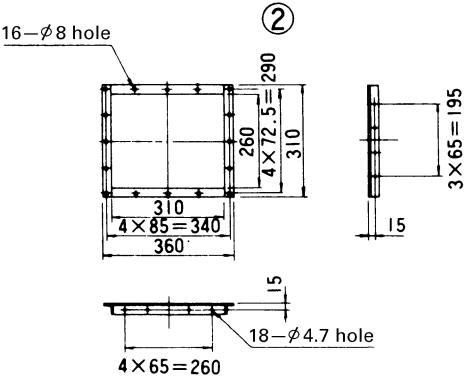
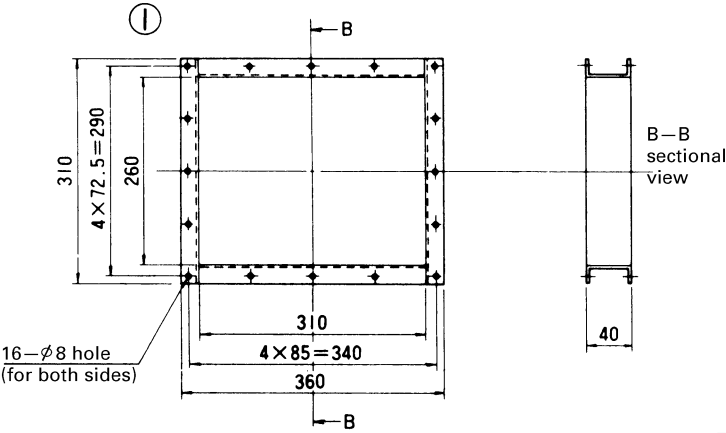
### 4.3 Parts

USP3H~USP8H



Part No.	Part Name	Material	Q'ty/set	Remarks
①	Base flange	Steel	1	t:1.6
②	Companion flange	Steel	1	

USP10H



Part No.	Part Name	Material	Q'ty/set	Remarks
①	Base flange	Steel	1	t:1.6
②	Companion flange	Steel	1	L25×25×t:3

## 5. Air Discharge Duct Connection (Without Plenum Chamber)

### 5.1 Cautions

USP3H

USP5H

#### 1. Mounting Work Procedure and Cautions

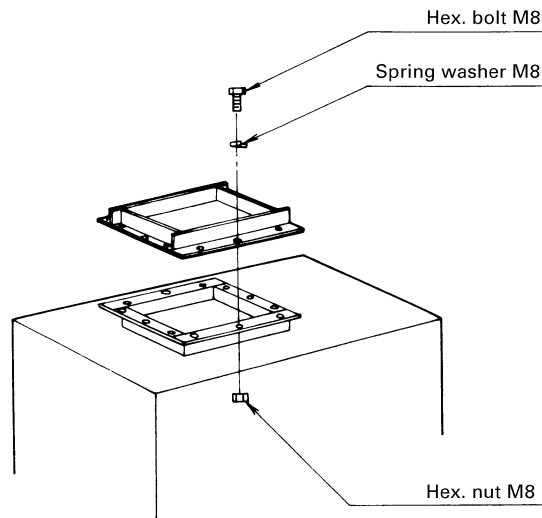
1. Mount the key and companion flanges.
2. Tighten them so tightly that there will be no air leakage.

#### 2. Cautions for use

- Be sure to apply canvas to the joint of the air conditioner and the duct in order to prevent the duct system and the air conditioner from vibrating.

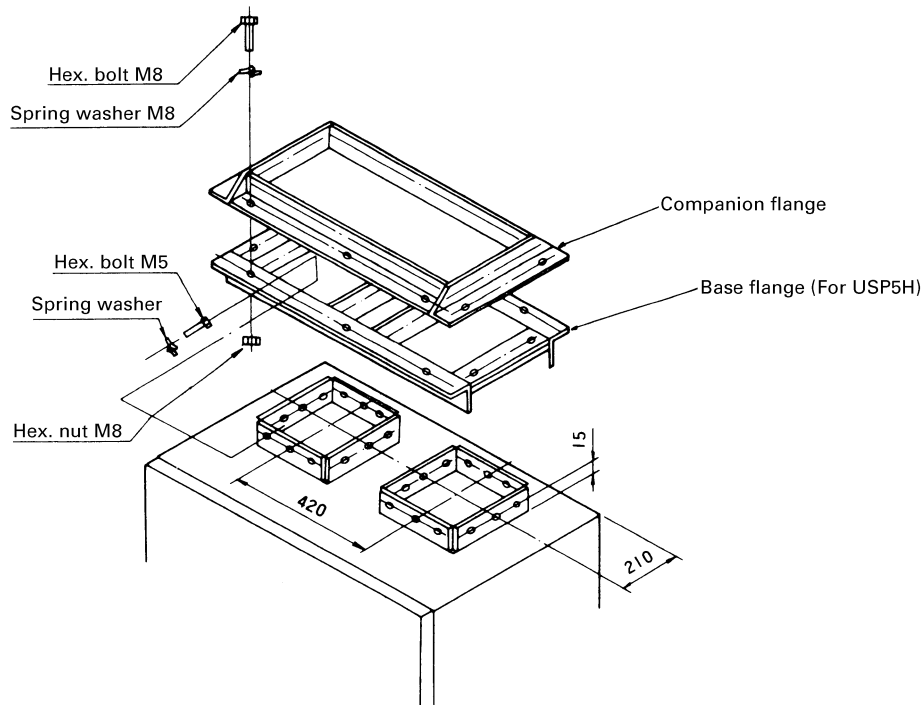
### 5.2 Mounting Procedure

USP3H



USP5H

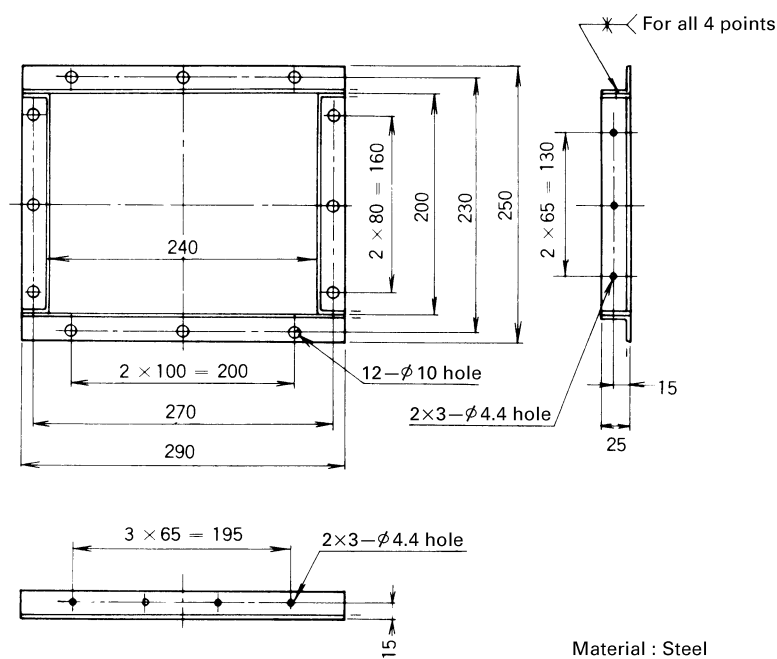
USP8H



5.3

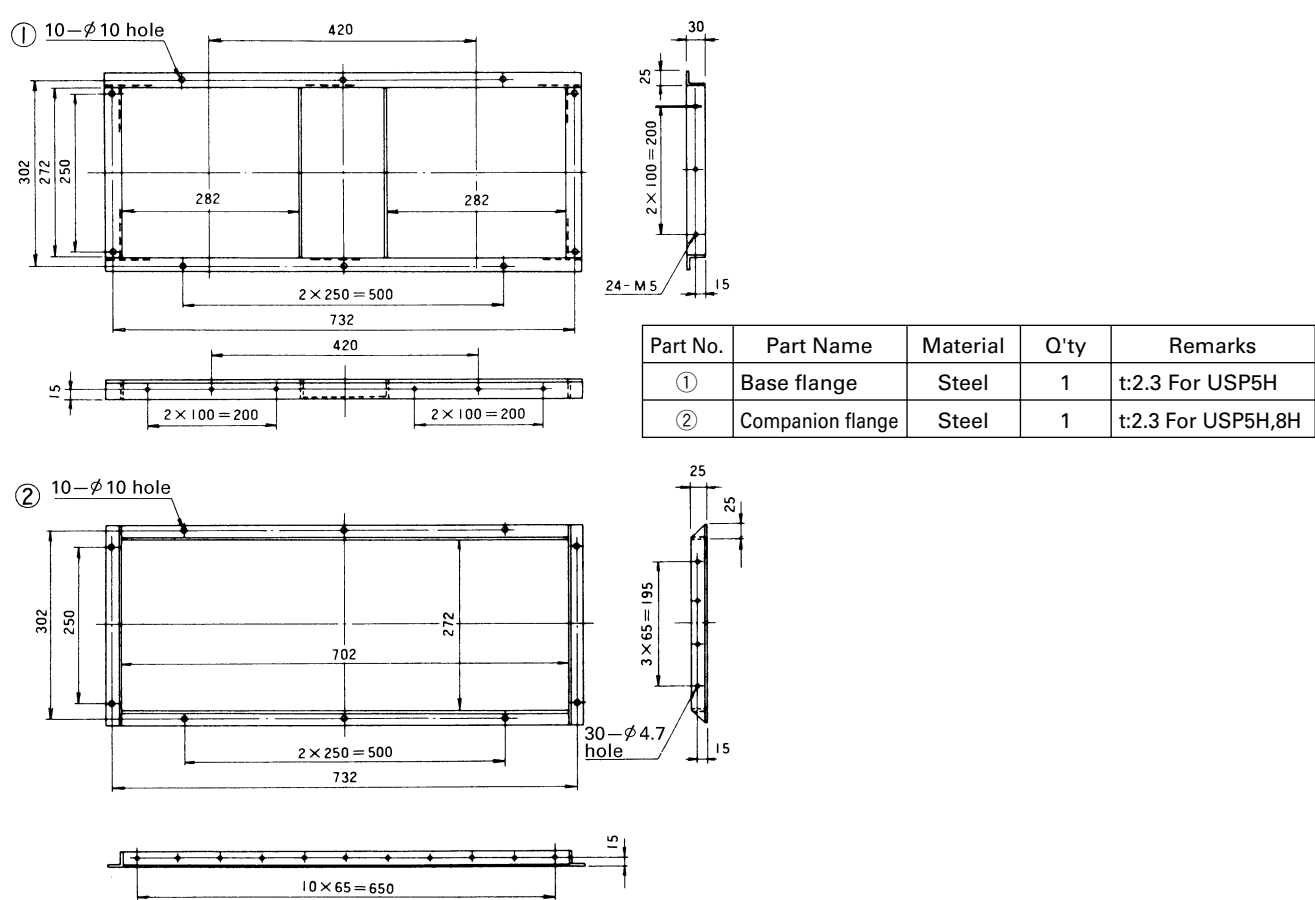
Parts

USP3H



USP5H

USP8H



## 6. Fan Motor One Size Larger

Installation of ducts to an air conditioner requires a considerably high external static pressure, which may overrange the working capacity of a motor and pulley for standard use. In such a case, it is necessary to replace the motor or pulley.

### 6.1 Applicable Model

Model	USP3H	USP5H	USP8H	USP10H	USP15H	USP20H
Item						
Replacement of fan motor and pulley	○	○	○	○	○	○
Fan motor capacity upgrading	○	○	○	—	○	○

### 6.2 Mounting Procedure

#### 6.2.1 Required Parts

	USP3H	USP5H	USP8H	USP15H
Fan motor	380, 400/400, 440V 50/60Hz, 0.75kW 4P	380, 400/400, 440V 50/60Hz, 0.75kW 4P	380, 400/400, 440V 50/60Hz, 1.5kW 4P	380, 400/400, 440V 50/60Hz, 5.5kW 4P
Magnetic switch for fan motor	CLK-15JTH40-P6 (1.5A set) ★	CLK-15JTH40-P6 (1.5A set) ★	CLK-15JTH40-P6 (3.2A set) ★	HOE-20F-TFH1B (11A set) ★
Motor setbolt	M8×30, 4pcs.		M8×35, 4pcs.	M10×35, 4pcs.
V-belt	Type A×1			Type B×2

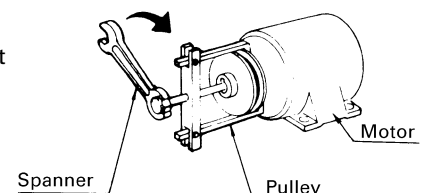
★ : Since the characteristics of motor varies depending on the manufacturer, select appropriate motor, fan and v-belt by referring to the above OC set values.

#### 6.2.2 Mounting Work Procedure

- In the case of fan pulley replacement only -USP3H~USP20H
  1. Remove the suction grille, front plate (upper) and rear plate.
  2. Remove the V-belt from the motor pulley, and remove the motor pulley from the motor shaft.
  3. Replace the V-belt and motor pulley with those supplied for replacement.
  4. Adjust the V-belt tension.
  5. Place the suction grille, front plate (upper) and rear plate back in position.
- In the case of double capacity fan motor-USP3H, USP5H, USP8H, USP15H
  1. Remove the suction grille, front plates (upper & lower) and rear plate.
  2. Remove the V-belt.
  3. Mount the motor pulley to the double capacity motor. (However, select the pulley within the range.)  
.....Refer to Page 27~28.
  4. Replace the fan motor with the double capacity motor. (Replace the motor setbolts with the ones M8 × 35).
  5. Replace the V-belt with the one of an appropriate length, and adjust the belt tension.
  6. Open the switch box cover and replace the fan motor magnetic switch.
  7. Close the switch box cover and place the suction grille, front plates (upper & lower) and rear plate back in position.

#### 6.2.3 How to pull off Fan Motor Pulley

Pull off the pulley in the following manner to prevent the motor shaft bearing from getting damaged.



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- The specifications, designs, and information in this brochure are subject to change without notice.